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INTRODUCTION

In accordance with the City Auditor's 1992-93 Audit Workplan, we have conducted an audit of the San Jose Communications Center (SJCC). In this first audit of the SJCC's operations, we limited our audit to reviewing the emergency medical dispatch process. Accordingly, we analyzed the Emergency Medical Services response times during 1992 for both the San Jose Fire Department and Santa Clara County-contracted paramedics. We then compared the 1992 results to those in our previous 1990-91 audit.¹

We conducted our audit in accordance with generally accepted government auditing standards. The Scope and Methodology section of this report further describes the limitations of our work, and Appendix C provides a glossary of terms.

The City Auditor's Office thanks the officials from the city of San Jose, Santa Clara County, and American Medical Response West who gave their time, information, insight, and cooperation. Their efforts made our review possible and more meaningful.

¹ Office of the City Auditor Report #91-04: *A Review of San Jose Fire Department And Santa Clara County Paramedic Response to Calls For Emergency Medical Service*, issued March 1991.

SCOPE AND METHODOLOGY

Our review provides detailed information to the San Jose City Council and the City Administration regarding the San Jose Communications Center (SJCC) Emergency Medical Services (EMS) dispatch operations as well as the San Jose Fire Department (SJFD) Emergency Response Program's EMS. This review is a follow-up to our prior review² and addresses how the performance of the SJCC has affected EMS delivery in the city of San Jose after nearly two years of operation.³

As part of our review, we developed a computerized database of selected EMS events. The database spreadsheet contains 27 fields of information for 297 EMS events. In addition, we created several formulae for calculating various time segments in the chronology of EMS responses.

Sources Of Information

We reviewed the following documents:

- Santa Clara County's 1977 *Agreement Between the City of San Jose and the Santa Clara County Central Fire Protection District Providing for the Furnishing by City of Certain Fire Services Within a Portion of the Service Area of Said District* (known as the "First Responder Agreement").

² Office of the City Auditor Report #91-04: *A Review of San Jose Fire Department And Santa Clara County Paramedic Response to Calls For Emergency Medical Service*, issued March 1991.

³ The San Jose Communications Center became operational October 1, 1990.

- Santa Clara County's 1984 *Agreement Between the Santa Clara County Central Fire Protection District and the City of San Jose for Automatic Aid Response of the Respective Fire Departments* (known as the "Auto-Aid Agreement").
- Santa Clara County's 1988 service agreements for emergency ambulance services with Medevac, Inc., and SCV Paramedical Services.⁴

We interviewed officials from the following entities:

- San Jose Fire Department (SJFD)
- San Jose Police Department (SJPd)
- Santa Clara County Communications Center (County Center)
- Santa Clara County Health Department EMS Administration
- American Medical Response West (AMRW)

We used the following computer reports and information:

- San Jose Police Department
 - ☐ 9-1-1 Positron Log
 - ☐ Computer-Aided Dispatch (CAD) Police Event Log
- San Jose Fire Department
 - ☐ Computer-Aided Dispatch (CAD) Fire Event Log
 - ☐ Computer-Aided Dispatch (CAD) Ambulance Event Log
 - ☐ Station Emergency Journal
 - ☐ Zone Building Block to Run Card File

⁴ The parent company of these ambulance service providers is now American Medical Response West.

- Santa Clara County Communications Center
 - ❑ Computer-Aided Public Safety System (CAPSS) Medical Case Log
- Santa Clara County Health Department
 - ❑ Paramedic Dispatch System (PDS) screen prints of Pre-hospital Care Report information
- American Medical Response West
 - ❑ Ambulance Dispatch Database

Time Period Reviewed

We reviewed all eligible emergency medical events from three randomly selected days during the time period of July 1, 1992, through September 30, 1992. We chose this time period so that we could compare our results to those from our previous review, which covered the time period July 1, 1990, through September 30, 1990.

Statistical Sample Of Emergency Medical Events

Our review was based primarily on an examination of a representative statistical sample of responses to calls for EMS. Of approximately 8,510 EMS events during our chosen time period, we ultimately selected and analyzed 297 events (3.5 percent of the total).

AMRW, the parent company for the ambulance provider, provided us with a computer disk of data relating to the ambulance dispatches for the three days in our sample, and we imported the data into our spreadsheet. (AMRW normally receives this type of data from the County Center per their agreement, and we verified its authenticity by comparing it to the County Center's CAPSS Medical Case Log

report.) In addition, for each of the EMS events reviewed, we manually input other data into our computer spreadsheet from source reports obtained from the SJPD, SJFD, the County Center, and the County Health Department.

As in our prior review, we quantified and compared data on the dispatch, turnout, travel, and total response times for both the SJFD and County-contracted paramedics. Furthermore, we reviewed the emergency response level codes to the hospital and the hospital emergency room dispositions. We also analyzed data on the nature of the events as documented by dispatchers at the County Center and by County-contracted paramedics.

Unfortunately, we were not able to obtain Pre-hospital Care Report information for one of the three days in our sample because of a County Health Department computer system problem; thus, we did not review and categorize the nature of events or the emergency room dispositions for that day.

We documented the number of events to which both the SJFD and SJPD units responded. We also documented the number of events where the SJFD dispatcher provided the caller with Pre-Arrival Instructions. For both SJCC and the County Center we calculated and compared data on call-answering and call-handling times.

Confidence And Precision Of Sample

Our sample selection criteria resulted in a total sample of 297 EMS events. The size of our randomly selected sample provides a 95 percent confidence level, with a precision of plus or minus 2.5 percent, that the descriptive attributes of our sample and the calculated response times are representative of all EMS events in the time period studied.

Factors Affecting Sample Selection Criteria

In our prior review we found that Mondays were low-volume EMS event days while Fridays tended to be the highest volume days. To ensure that our sample was representative, we randomly selected seven different days of the week. From the seven days, we then judgmentally selected three days to include at least one high-volume day, one low-volume day, and one day from each month. The three days selected were July 24, August 2, and September 14, 1992.

All Code 3 EMS events (requiring red lights and siren) were eligible for inclusion in our review. We excluded from our sample Code 2 events (urgent, but no red lights and siren) that occurred on the days we selected because SJFD is not dispatched to these Code 2 events. We also excluded some Code 3 events from our sample because the reporting party or another public agency, such as SJPD or the County Sheriff's Office, requested that SJFD not respond. We excluded these events because we could not compare the SJFD's performance against the County-contracted paramedics. Similarly, we excluded Code 3 events when both the SJFD and the County-contracted paramedics were dispatched, but the dispatch was canceled before they were en route.

Finally, we excluded from our sample those events which were created as a result of additional calls reporting the same incident. Also, if multiple fire units or ambulances were dispatched for the same emergency incident, we counted the event only once in our sample.

Sample May Not Be Representative Of The Whole Year

We are aware that seasonal variations may affect the volume or nature of 9-1-1 calls as well as the response times. During our prior review, which also covered only a three-month period, we reviewed the number of 9-1-1 calls by

quarter for fiscal years 1988-89 and 1989-90 and found only small quarterly variances in the number of calls. However, we were not able to determine the extent to which the nature of emergency medical incidents or response times vary by the time of year or are affected by seasonal changes. As a result, our sample accurately reflects EMS activity only for July 1992 through September 1992 and may not be statistically representative of 1992 as a whole because of possible seasonal influences.

Computer Systems

The computer reports obtained from SJPD, SJFD, and the County Center are generated on three different computer systems: (1) the 9-1-1 Positron System, (2) the SJCC's CAD System, and (3) the County Center's CAPS System. The internal clocks for each of these computer systems must be manually reset after each time the computer system has been down.

The 9-1-1 Positron's clock is controlled by Pacific Bell,⁵ and we assumed this to be the "correct" time. However, system clocks for the Positron and the CAD are not synchronized. Because both Positron and CAD record the same point in time when the fire dispatcher receives a call transferred from the SJPD call-taker, we were able to measure the time difference. We adjusted the subsequent points in time recorded by the CAD when we performed elapsed time calculations. Based on our review of the County Center's procedures for setting its CAPSS clock to Pacific Bell time, as well as our results of call-handling calculations, we assumed the CAPSS clock to be synchronized with the SJCC's 9-1-1 Positron.

⁵ Pacific Bell leases the Positron System to the City for use in the SJCC.

We were not able to determine why the SJCC's CAD clock was not correct within the scope of this review. Both the SJFD and SJPD are aware of this problem, and in the Other Pertinent Information section of this report we suggest they continue to pursue resolving the problem.

To complete our review of the EMS dispatch process and response times within a limited time frame, we did only limited testing to determine the accuracy and reliability of information in the various computer reports used. Such testing included first-hand observations of dispatcher call-answering, call-handling, and dispatching activities that result in the recording of EMS event information. We also reconciled the total number and type of EMS events recorded for our selected days in the SJFD CAD fire event log to the SJPD CAD police event log and to the County's CAPSS medical case log as well. However, we did not review the general and specific application controls in any of the computer systems used to produce any of the documents we used.

BACKGROUND

New San Jose Communications Center

Construction of the San Jose Communications Center (SJCC) near City Hall was completed in April 1990. When it became operational on October 1, 1990, the city of San Jose (City) assumed responsibility for providing its own emergency dispatch services. The City Council, around 1983, decided it would be in the best interests of the City to "take back" from Santa Clara County (County), the dispatch and communications functions for all public safety services in the City.

The City-owned and operated communications facility contains:

- A network of communications computer systems;
- Individual dispatch centers for the San Jose Fire Department (SJFD) and the San Jose Police Department (SJPd);
- Police Patrol Division Headquarters; and
- Two floors of parking for police vehicles.

The SJCC employs 139 police dispatchers and 33 fire dispatchers. The first training academy in 1990 for 152 dispatchers covered an intensive 10-week training period. This first group of dispatchers came primarily (60 percent) from the Santa Clara County Communications Center (County Center) that had previously handled the City's 9-1-1 call-answering and public safety dispatching. Others were recruited from centers throughout the United States.

The SJCC is the site of the second largest Public Safety Answering Point (PSAP) in California.⁶ It is the largest communications project ever attempted in the United States and the only time a jurisdiction ever set out to:

- Build a communications building and tailor it for dispatch services;
- Recruit, hire, and train the personnel to operate it; and
- Procure the latest operating technology.

History Of EMS In San Jose

Prior to 1978, the SJFD provided pre-hospital emergency care that was largely standard first aid. In 1978, the SJFD entered into an agreement with Firefighters Local 873 to upgrade the standard first aid services currently being administered to the level of Emergency Medical Technician (EMT-I). This upgrade resulted in a higher level of service to citizens by providing advanced techniques of patient assessment, scene control, extrication, oxygen administration, early detection of life-threatening illness and injuries, childbirth, and triage.

In 1979, the County contracted two ambulance companies to provide paramedic services on a County-wide basis. With the integration of the County-contracted paramedic program and the SJFD's role as first responder, the upgraded level of emergency medical care was used as a role model for the County and the state of California.

During this same late 1970s period, the SJFD Bureau of Education and Training EMS Unit was formed. Its primary purpose was to develop and administer the EMT certification and re-certification programs, interact and

⁶ Only the PSAP for the Los Angeles Police Department is larger.

cooperate with the County's EMS Administration, and to recommend and implement department-wide EMS system policies.

In 1985, there was a dramatic 35 percent increase in the number of SJFD's responses to emergency medical calls. Effective July 1, 1985, SJFD responded to all Code 3 EMS calls in its fire response area. Prior to this date, SJFD personnel responded only to "resuscitator" and "rescue" type EMS events.

In 1989, both of the companies providing ambulance service in the County were acquired by the same parent company. Thus, American Medical Response West (AMRW) through its two subsidiaries, Medevac and SCV, is today the sole provider of paramedic service under contract to the County. AMRW currently serves the County with 15 to 22 active ambulance units.

Between October 1992 and June 1993, SJFD is upgrading its existing EMS to include heart defibrillation. This advanced level of service is estimated to improve the out-of-hospital cardiac arrest survival rate from 2 percent to approximately 10 percent. The SJFD has purchased 40 defibrillator devices, and all the firefighters for the City's 29 engine companies and 10 truck companies will have additional training beyond the EMT-I level to EMT-D.

City Departments Involved In EMS And The San Jose Communications Center

Operation of the SJCC is a cooperative effort of four City departments:
(1) Police, (2) Fire, (3) Information Systems, and (4) General Services. The key roles of these departments are as follows:

- **Police**

- ☐ Bureau of Technical Services (BTS) Communications Division provides dispatch training and support, dispatch operations, and systems development.

- **Fire**

- ☐ Bureau of Support Services (BSS) Communications Division provides dispatch training and support, dispatch operations, and systems control.

- **Information Systems**

- ☐ Systems and Programming Division dedicates two programmers for communications, three analysts for police systems, and one analyst for fire systems development and maintenance.

- **General Services**

- ☐ Communications Division provides installation and maintenance of telephone, voice and digital radio equipment, maintenance of the fire station alerting system, and ensures technical reliability of the SJCC's public safety communications equipment.

Charts 1 and 2 show the organization for the SJPD and SJFD bureaus as described above.

CHART 1

**SJPD ORGANIZATION CHART -
BUREAU OF TECHNICAL SERVICES**

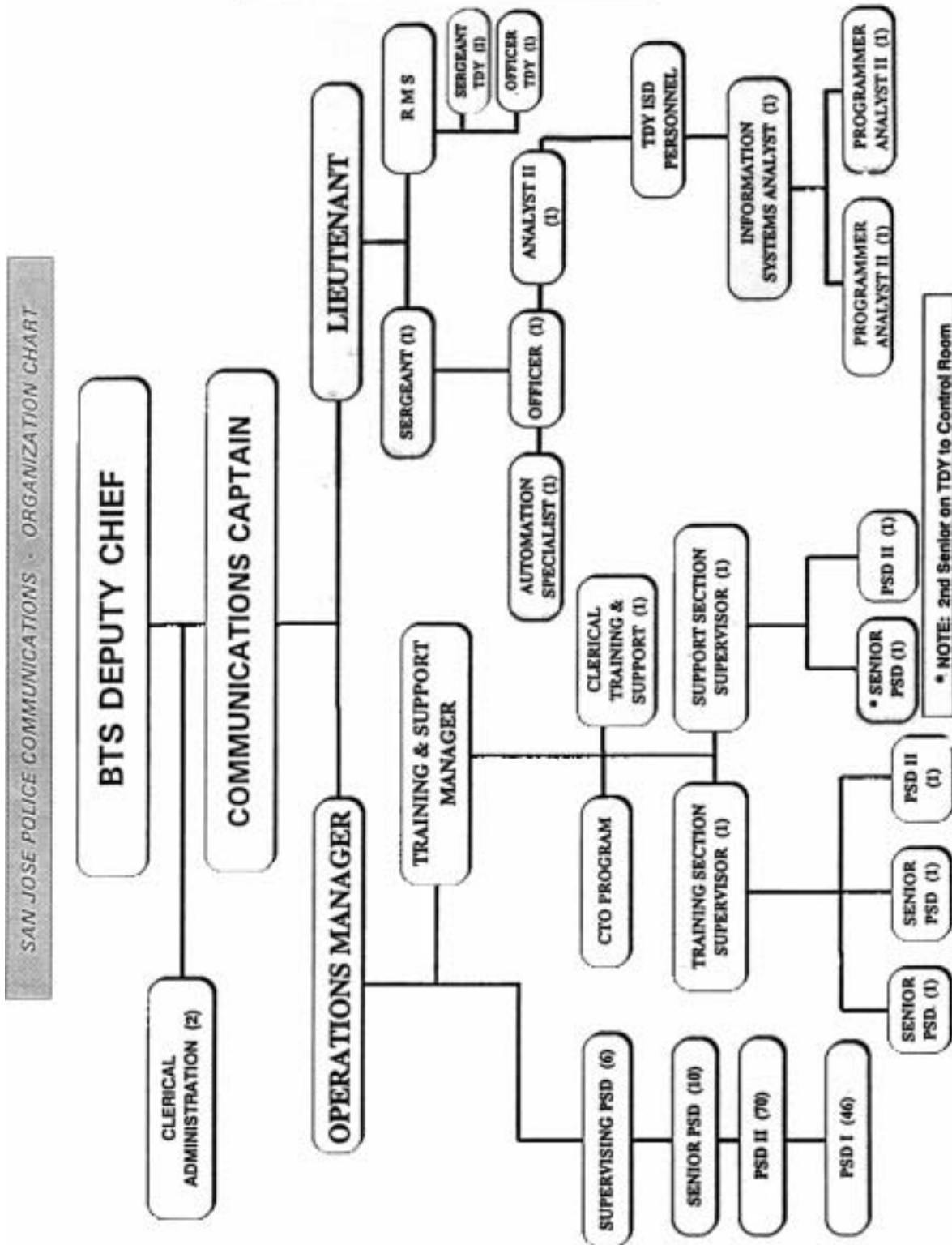


CHART 1 (Cont.)

SJPD ORGANIZATION CHART - BUREAU OF TECHNICAL SERVICES

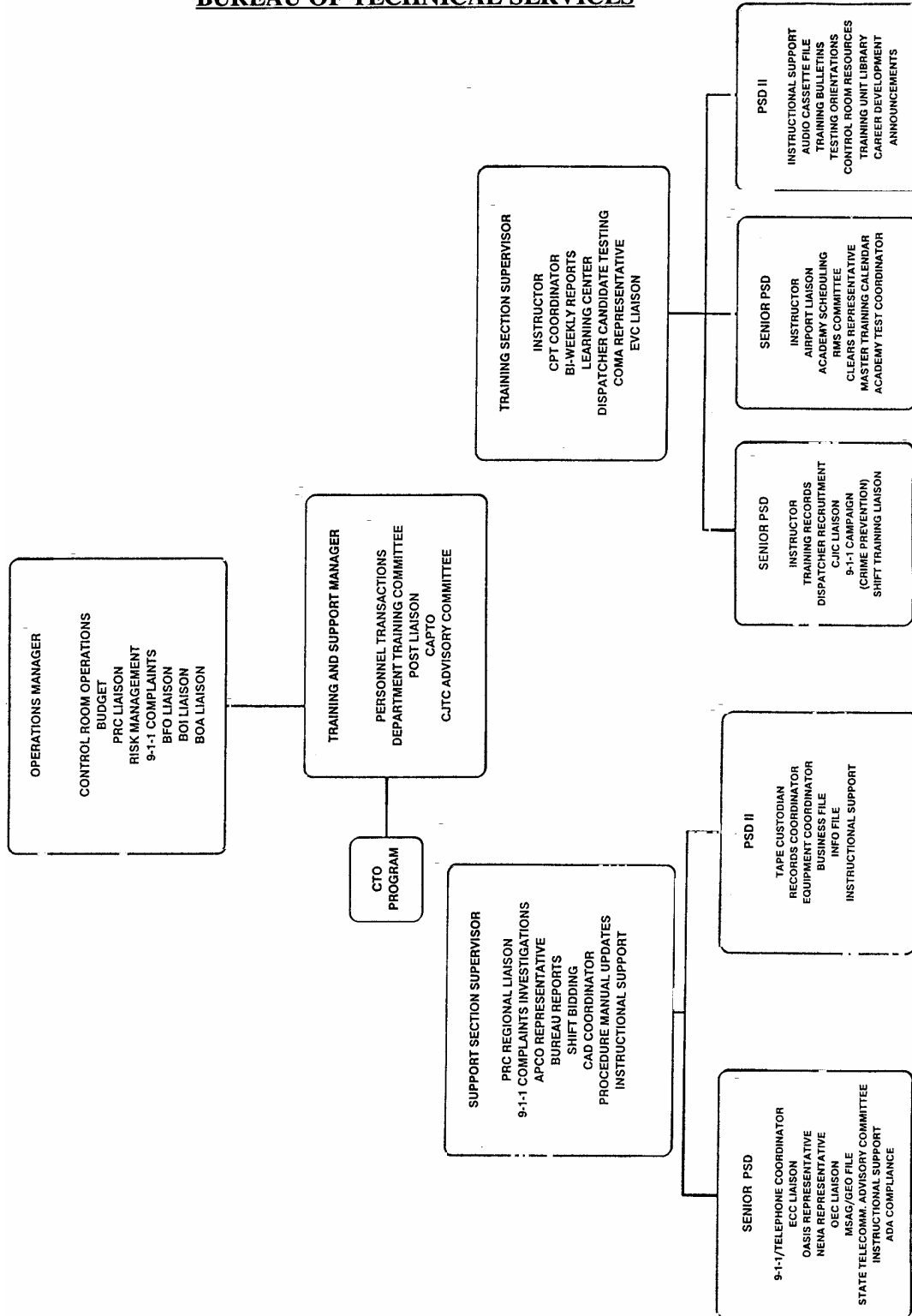
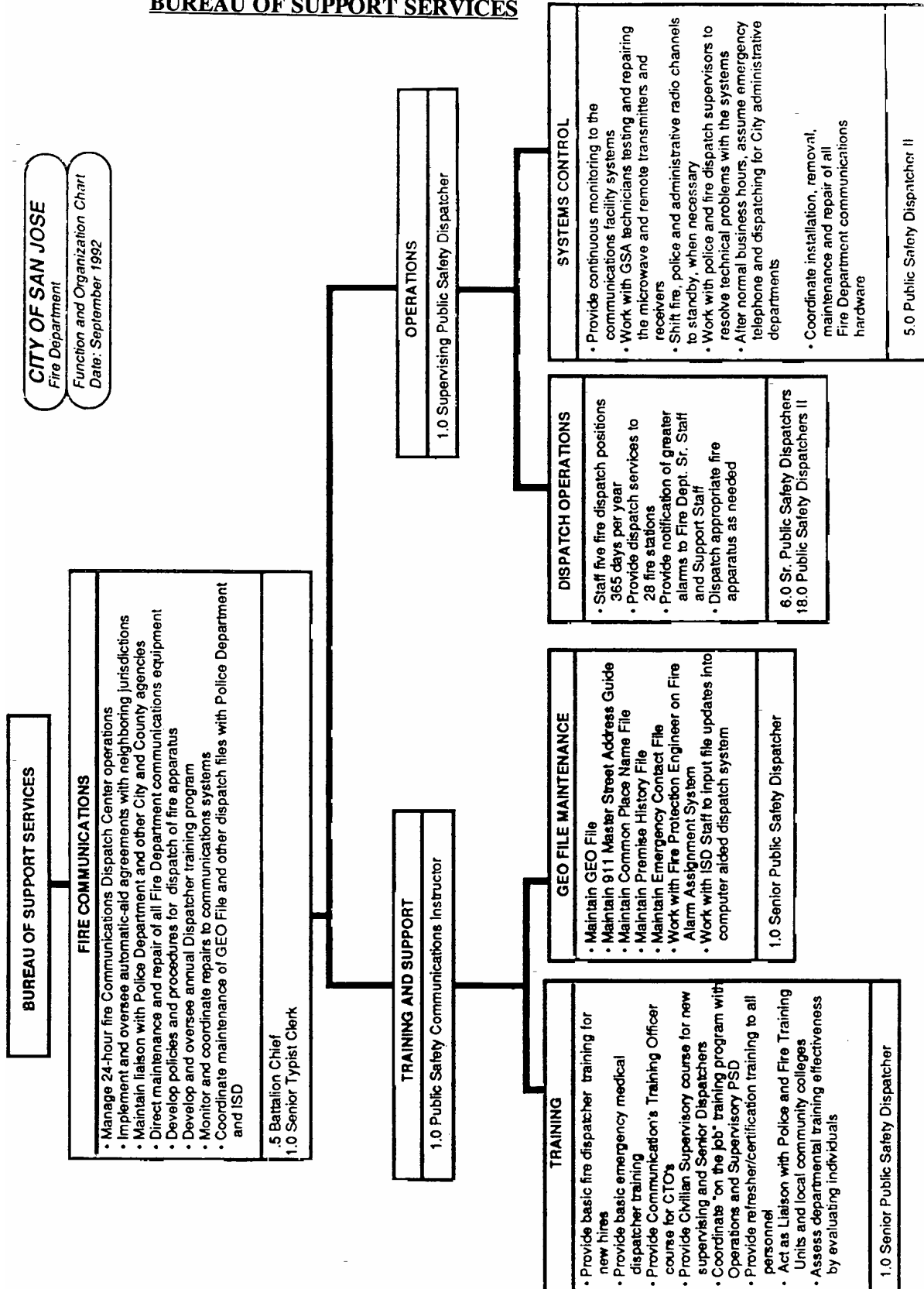


CHART 2

SJFD ORGANIZATION CHART - BUREAU OF SUPPORT SERVICES



In addition, the SJFD's Bureau of Field Operations (BFO) and Bureau of Education and Training (BET) play major roles in the provision of EMS. The BFO responds to the scene of medical emergencies with its fire station equipment and personnel. The BET trains and maintains all line personnel to the level of EMT-D certification.

Department Mission And Program Purpose Statements

Police Department

The SJPD's mission is:

To prevent crime and disorder; to preserve peace, community safety and well-being; to protect life and property and individual freedom for personal safety and well-being through the enforcement of State laws and City ordinances.

To help meet its mission of preserving community safety and well-being, the SJPD's Communications Division, under the responsibility of the Bureau of Technical Services (BTS), answers 9-1-1 calls requesting emergency services. Applicable portions of the BTS program purpose and description in the 1992-93 operating budget state:

Computer aided 24-hour emergency communications services are provided. Requests for police services are directed to the appropriate service unit. Requests requiring an emergency response are dispatched according to priority type to field units. Operational support for dispatching operations is provided through automated systems.

Fire Department

The SJFD's mission is:

To prevent fires from occurring and, when fires and other life threatening incidents do occur, to utilize resources effectively and efficiently to protect life and minimize property damage.

To accomplish its mission of protecting life, the SJFD provides emergency medical and rescue services. According to the BFO's Emergency Response Program description, EMS are provided to victims of heart attacks, strokes, injuries, and vehicle accidents. The nature of such emergency incidents might also include events which involve poison, drowning, burns, seizure, or obstetrics.

The SJFD responds to emergencies from its 29 fire stations staffed with a total of 29 engine companies and 10 truck companies. The SJFD provides emergency services to a geographical area of approximately 200 square miles, including approximately 28 square miles of territory outside the City under contract with the County's Central Fire Protection District. The total area of protection also includes approximately 44,000 acres of wildland.

Support for the SJFD's Emergency Response Program comes from the Bureau of Support Services (BSS). In part, the 1992-93 operating budget program purpose description states:

The Support Services Program includes Education, Training, Vehicle and Facilities Maintenance, Fire Protection Planning, Alarm Assignment Systems and Emergency Dispatch Services. . . . High level maintenance of all Fire Department vehicles, facilities and communications equipment is paramount in providing continuous, around-the-clock emergency service. . . . Fire demand zones are also reviewed in an effort to improve response times. Dispatch procedures are monitored and improved to assure delivery of the closest available fire unit.

Within the BSS is the SJFD Communications Division. The purpose of the Division's Emergency Dispatch Program is "*to provide prompt and accurate emergency dispatch of fire apparatus to the citizens of San Jose.*" The Division is also responsible for coordinating the purchase, installation, and maintenance of the SJFD's communications hardware and software needed for emergency dispatching.

The Division's Systems Control area provides continuous monitoring of the communications facility systems.

Operating Budget For Communications And EMS

The full annual cost of operating the SJCC is not known. This is because it does not exist as a separate department or program in the City's budget. Rather, costs for staffing and operating the SJCC are divided among the four key City departments according to their roles as described on page 12 in this report. Furthermore, the cost of providing EMS is even more obscure if you try to consider what portion of each department's budget actually supports EMS as opposed to all the other services the SJCC provides. We also do not know the exact percentage of the SJFD's BFO and BET costs that are attributable to EMS according to their roles described on pages 12 and 16 of this report. For example, during the three-month period from July 1992 through September 1992, emergency medical dispatches accounted for 71 percent of total fire unit dispatches. Thus, 71 percent of the operating budgets of SJFD's three major bureaus involved with communications and EMS (BSS, BFO, and BET) could be considered as supporting the cost of providing EMS in the City.

As a result, we did not calculate the total cost of either operating the SJCC or providing EMS because of unknown:

- BTS (SJPD) costs for training, dispatch, and various support services related to the SJCC and EMS;
- BSS (SJFD) costs for training, dispatch, and various support services related to the SJCC and EMS;
- BFO (SJFD) costs for personnel, apparatus, and vehicles used to respond to emergency medical calls;

- BET (SJFD) costs for EMT certification and re-certification training;
- Information Systems costs to support the SJFD and the SJPD communications systems and computerized management information related to the SJCC and EMS; and
- General Services costs to support the SJFD and the SJPD radio and public safety communications equipment.

Still, to give some perspective as to the costs of operating the SJCC and providing EMS, we illustrate in Table I the operating budget for the SJPD and SJFD as a whole compared to the portion for their respective bureaus and programs involved with the SJCC and EMS.

TABLE I
SJPD AND SJFD OPERATING BUDGETS
1990-91 THROUGH 1992-93

	<u>1990-91</u>	<u>1991-92</u>	<u>1992-93</u>
Total Police Department	\$106,544,069	\$117,057,449	\$126,916,716
Bureau of Technical Services	14,438,567	15,231,192	17,869,226
Total Fire Department	53,723,817	55,393,289	64,182,127
Emergency Response Program	44,444,942	45,732,475	53,965,393
Support Services Program	4,087,023	4,252,964	4,875,458

Capital Budget For Communications

The General Services Department is responsible for funding communications projects including CAD system hardware and software enhancements, Emergency Operations Center equipment necessary to become functional, and scheduled replacement of mobile radios necessary for police, fire, and City maintenance operations. Below are some of the projected expenditures in the 1993-1997 Capital Improvement Program for communications under the General Services Department:

CAD System Enhancements (for management reporting)	\$150,000
Emergency Operations Center Equipment	\$180,000
Evergreen Area Remote Radio Site	\$196,000
Mobile Communications Equipment Replacement	\$2,069,000

Volume And Jurisdiction Of EMS Events

This report section describes the overall volume of EMS events and their sources and locations. Subsequent sections of the report provide more details about response times and services provided.

On the three days we selected for our sample there were 485 EMS events in the County to which County-contracted paramedics were dispatched.⁷ As shown in Table II, 64 percent of the County Center's EMS dispatches were in San Jose fire response areas.

⁷ Excludes primary EMS dispatches for events in Campbell and Palo Alto because these cities have their own paramedics; thus, the County Center does not handle primary EMS dispatching for them. The County Center will dispatch an ambulance for Campbell or Palo Alto only if their paramedics are already engaged on a call and not available.

TABLE II
VOLUME OF COUNTY EMS DISPATCHES
FOR 1992 SAMPLING PERIOD

City/Jurisdiction	Events	Percentage
San Jose	294	61%
County Consolidation	16	3%
San Jose Fire Response Area	310	64%
Mountain View	32	6.6%
Santa Clara	28	5.8%
Sunnyvale	26	5.4%
Central Fire District	23	4.7%
Gilroy	18	3.7%
Department of Forestry	14	2.9%
Milpitas	12	2.5%
Saratoga	7	1.4%
Morgan Hill	5	1.0%
Los Altos	4	.8%
Palo Alto	3	.6%
Unincorporated County	2	.4%
Cupertino	1	.2%
Other Jurisdictions	175	36%
TOTAL	485	100%

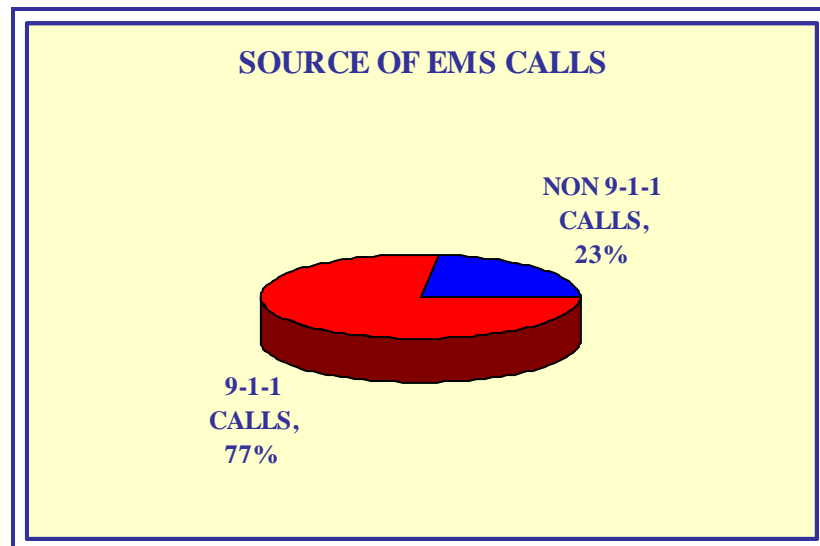
SJFD's response area includes areas within San Jose's city limits, County consolidation areas covered by a First Responder Agreement, and other jurisdictional areas covered by an Auto-Aid Agreement.⁸ The other 36 percent of calls to which County-contracted paramedics responded were in other cities' jurisdictions, the Central Fire Protection District, Department of Forestry fire response areas, and other unincorporated areas of the County.

⁸ Refer to the Scope and Methodology section of this report for a further description of these agreements. It should be noted that on the days selected for our sample, there were no EMS responses by SJFD into auto-aid areas.

Source Of EMS Calls

Citizen reports of medical emergencies through the 9-1-1 system accounted for 77 percent of the 297 EMS calls in our study. The remaining 23 percent of the calls were non-9-1-1 originated as shown in Graph 1. For example, some emergency calls come in via 7-digit emergency telephone numbers to the SJCC or arrive through dispatch radio communications from the SJPD or direct lines from other public agencies such as the County Center.

GRAPH 1



The SJCC is a designated Public Safety Answering Point (PSAP) for all 9-1-1 calls originating in the City. As such, Pacific Bell routes 9-1-1 calls directly to the SJCC for answering. Prior to the October 1, 1990, opening of the SJCC, Pacific Bell routed the City's 9-1-1 calls to the County Center. For 9-1-1 calls originating in unincorporated areas of the County, the County Center is still the designated PSAP. (The County Center answers 9-1-1 calls from Monte Sereno, Saratoga, and Cupertino as well.)

The County Center also receives calls made to the 7-digit ambulance emergency telephone number and radio calls from the County Sheriff's units. In addition, the California Highway Patrol (CHP) may contact either the SJCC or the County Center to request EMS, depending on the fire jurisdiction for the location of the incident.

Our audit revealed that 10 percent of the total EMS calls in our sample were calls that first went to the County Center, which in turn, via direct telephone line, notified SJFD of the need for an EMS dispatch of a fire unit.

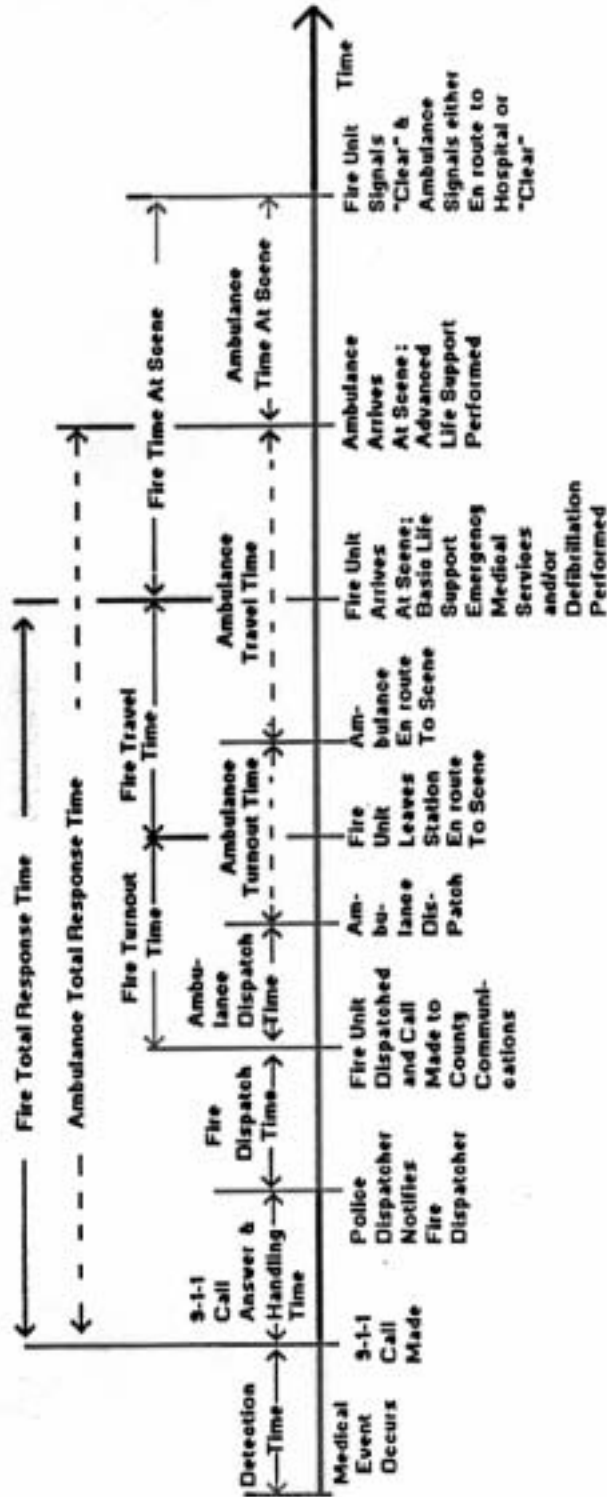
Time Elements Of Response To EMS Calls

Part of the City Auditor's audit objectives were to (1) calculate how long it took the SJFD and County-contracted paramedic dispatched units to respond to an EMS event, (2) determine if the SJPd, SJFD, and the County-contracted paramedics are meeting their own EMS time responsiveness objectives, and (3) compare these results with those from the City Auditor's 1990 study.

Diagram I shows the various EMS response time segments for which we calculated average response times. A summary of the average EMS response times is in Appendix E. Following Diagram I are brief descriptions of the various time segments in an EMS response.

DIAGRAM I

TIME ELEMENTS OF A TYPICAL 1992 EMS RESPONSE WHEN 9-1-1 CALL IS ANSWERED BY SAN JOSE COMMUNICATIONS CENTER



Note: The relative lengths of the time segments are not drawn to scale to allow space for descriptions.

9-1-1 Call-Answering And Call-Handling

We measured 9-1-1 call-answering time from the time of first telephone ring in the SJCC to when a police call-taker answers the call. After a call-taker answers a 9-1-1 call, there is a period of time during which the 9-1-1 call-taker determines the type of emergency. If the nature of the emergency is medical only, the call is routed to a primary fire dispatcher. Thus, total 9-1-1 call-handling time in the SJCC is measured from when the police call-taker first answers the call to when the primary fire dispatcher "creates" the event for dispatch.⁹ This total call-handling time includes not only the time it takes the call-taker to route the call to the Fire Dispatch Room, but also the time it takes for the primary fire dispatcher to answer the call and enter sufficient information in the event record to prepare for the actual dispatch by a secondary fire dispatcher.

Notification To The County Center

Normally, as one of the secondary fire dispatchers completes the dispatch of the first due fire unit, the other secondary dispatcher is simultaneously making contact with the County Center to request an ambulance. We measured the length of time for this notification from the time of the fire unit dispatch to when the County Center's primary medical dispatcher marks the time of location verification. Thus, included in this segment is the time for the telephone to ring at the County Center, time for the County dispatcher to answer, time for the fire dispatcher to verbally relay the incident address, and time for the County

⁹ The term "event" refers to a sequentially numbered dispatch record for a particular emergency incident. At the point when the primary fire dispatcher creates the event, the CAD system actually duplicates the information, creating both fire and ambulance event records simultaneously. The primary fire dispatcher then routes the fire event to a secondary dispatcher, who proceeds to complete the fire unit dispatch, and routes the ambulance event to another secondary dispatcher, who calls the County Center to request an ambulance.

dispatcher to type the location into the computer and request computer verification of the address.

Call-Handling By County Center Medical Dispatch Personnel

After location verification, the primary medical dispatcher will enter other pertinent incident details for the medical emergency in the County Center's computer and route the "created" event to a secondary medical dispatcher. The secondary dispatcher locates the closest available ambulance and sends out the initial dispatch "ring-down" signal to that ambulance. We measured the County Center's call-handling time as the time from location verification to the time of first dispatch contact with the ambulance.

Dispatch Time

The dispatch time segment is measured from the time the secondary dispatcher (fire or medical) is notified of a call to the time the notification to the dispatched unit (fire or ambulance) is complete. For the SJFD it would be the time required to answer the call, locate and send a dispatch signal to the first due fire unit. For the County Center, it would be the time from the first dispatch "ring-down" of the closest available ambulance to when that ambulance signals acceptance of the dispatch, also known as "dispatch complete." In between the "ring-down" and "dispatch complete" is when the medical dispatcher relays the incident location and necessary details to the paramedics.

Turnout Time

Turnout time is the EMS response time segment measured from acceptance of the dispatch notification, whether it be to a fire unit or an ambulance, to when the dispatched unit goes en route to the emergency scene.

Travel Time

Travel time is measured from the time a dispatched fire unit or ambulance goes en route to its arrival at the emergency scene.

Total Response Time

For the purpose of our review, the total response time segment starts with the time someone called 9-1-1 (first ring) to the time help arrived on scene of the incident. This total response time was measured for both fire and ambulance units.

EMS Dispatch Process And Procedures

Currently, all public safety dispatchers for the SJPD and SJFD are physically located at the SJCC near City Hall.¹⁰ Medical dispatchers (who dispatch County-contracted paramedics) and dispatchers for the County Central Fire Protection District and County Sheriff's Office are physically located at the County Center.

Although the City's police dispatchers normally answer 9-1-1 calls and fire dispatchers normally dispatch fire units and contact the County Center for an ambulance, all receive orientation training in each other's jobs to promote teamwork and enable them to function efficiently in extreme situations. A diagram of the 1992 EMS dispatch process for the SJCC and County Center can be found at Appendix I. See Appendix H for a diagram of the process prior to October 1, 1990.

¹⁰ At the time of the City Auditor's 1990 review, all emergency services dispatchers were physically located at and employed by the County Communications Center.

The Automatic Call Distributor System

The SJPD's Bureau of Technical Services uses police dispatch personnel as call-takers in the Police Dispatch Room to answer 9-1-1 calls for all types of emergencies (police, fire, EMS). In the SJCC, the Automatic Call Distributor (ACD) system automatically distributes the incoming emergency calls to the first available call-taker according to a priority sequence. The system also distributes the workload evenly among all call-takers on duty during the current shift.

To maximize the use of staff, especially during unusual crisis times, the SJCC's operating management can change the ACD system coding to designate how many and which call-taking positions are for 9-1-1 call-taking, police dispatching, and fire dispatching respectively. This ability allows for flexibility in their response to emergency incidents.

The Abandoned Call Call-Back Program

If an incoming call waits longer than 10 seconds to be answered, the caller will hear a tape recorded message in three languages (English, Spanish, Vietnamese) advising them that the call is waiting to be answered by the first available call-taker. If the call has still not been answered by a call-taker within 40 seconds, a bell sounds to alert the watch supervisor. However, because the call has been "answered" by the system, the address and phone number of the incoming 9-1-1 call has already been captured and this information prints out at an assigned station. Thus, if within the first 5 to 10 seconds, a 9-1-1 call is disconnected or abandoned (the caller hangs up) before a human call-taker can answer the call, the telephone number is available for an attempted "call-back."

The call-taker assigned to the call-back position is required to attempt to call the telephone number of all abandoned calls. When the call-back is made, the call-

taker inquires as to whether someone needs to report an emergency. If contact is not made, a check for the address in the cross directory is made. If necessary, the unlisted address is obtained from the telephone company's chief special agent.

In the six months from January to June 1992, there were 13,901 abandoned calls investigated which resulted in 816 (6 percent) valid events. San Jose is unique among major cities in providing this call-back service and will continue to evaluate the program results.

9-1-1 Call-Taker Decisions

A management audit of San Francisco's 9-1-1 Emergency Services System describes the role of police dispatchers as call-takers that applies equally well to San Jose:

Civilian Police Communications Dispatchers, who are the key persons in an effective 911 Emergency Services System, work in a highly stressful environment. The ability of dispatchers to obtain relevant information from members of the public, whose emotional states may range from mild excitement to outright panic, and their ability to make sound dispatch decisions that often involve life threatening situations, represents the first step in the provision of those services that protect the lives and property of persons within the City.

Once a call-taker has answered the 9-1-1 call, the address, phone number, and nature of phone location information appears on a monitor at the call-taker's station.¹¹ The call-taker then confirms the incident location and obtains information from the reporting party to determine whether it is a medical, fire, or police emergency or non-emergency incident. Thus, the 9-1-1 call-taker makes the following decisions after answering the call:

¹¹ This is the information supplied by the Pacific Bell ANI/ALI system. For more details, refer to the glossary in Appendix C.

- *Is this an emergency or non-emergency?*
 - ☐ For a non-emergency, the caller is either routed to a police report-taker or referred to the non-emergency telephone number of the proper authority.
- *If an emergency, is it a police, fire, and/or medical emergency?*
 - ☐ If the emergency is a fire or medical emergency only and does not require a police dispatch, the call is routed to Fire Dispatch.
- *If the emergency requires police dispatch, does it also require a fire unit or ambulance to be dispatched?*
 - ☐ If no, the call-taker proceeds to "create the police event screen" and routes the event information to the appropriate police radio dispatcher.
 - ☐ If yes, the call-taker proceeds to create the "combined event screen" and routes event information to both Fire Dispatch and the police radio dispatcher.¹²

The 9-1-1 emergency system is "caller driven," meaning that the number and type of equipment and personnel dispatched depends largely on the information the reporting party provides to the 9-1-1 call-taker. Thus, the initial level of response may or may not be an appropriate level. Often the primary call-taker has to rely on the caller's (reporting party) judgment that a fire or ambulance unit is not needed. The policy of both the SJPD and SJFD is to err on the side of over-response if one is to err at all. In other words, "If in doubt, send 'em out!"

Fire Dispatch Room At The SJCC

¹² See more discussion about combined events on page 32 in this report.

Once a call has been determined to be an EMS call, the Fire Dispatch Room is notified. The normal staffing level for the Fire Dispatch Room is one senior dispatcher (supervisor), one primary dispatcher, two secondary dispatchers, and one dispatcher in the Systems Control Room.¹³

There are three types of dispatcher positions within the Fire Dispatch Room. The primary responsibilities of the three positions are as follows:

Fire -1 Primary call-taking and giving Pre-Arrival Instructions

Fire -2 Fire unit dispatching (fire event "owner")

Fire -3 Monitoring radio communications and contacting Medical Dispatch at the County Center (ambulance event "owner")

Each position has assigned primary responsibilities as described above; however, the staff members are cross-trained so that they are flexible and able to perform every position in the Fire Dispatch Room. In addition, the senior dispatcher and the Systems Control Room person are backup call-takers.

Pre-Arrival Instructions

Beginning September 23, 1991, the fire dispatchers at the SJCC have provided Pre-Arrival Instructions (PAI) service to citizens calling from within the San Jose fire response area to request EMS. These helpful lifesaving instructions assist callers to provide immediate medical care for the injured party until the SJFD unit or County-contracted paramedics arrive. During our study,

¹³ SJFD is responsible for staffing the Systems Control Room. The dispatcher at this position monitors all the SJCC communications systems and equipment. In addition, Systems Control handles the "after-hours" dispatching for Streets & Traffic and General Services Departments.

we found that the fire dispatchers provided PAI service for 32 percent of the EMS events.

*SJFD Station Alerting System
And Fire Unit Digital Status Relay*

A fire dispatcher is able to dispatch the selected first due fire unit by pressing a single button that (1) sends the address and details to the station printer, (2) sounds the station bell, (3) activates the station night lights, and (4) opens the station intercom so the dispatcher can announce the assignment.

At various times during the event, the dispatched fire unit signals changes in status (e.g., going en route or arriving at the scene) via an electronic digital status button in the engine or truck. The signal is received by the Computer-Aided Dispatch (CAD) system at SJCC, and the time and status are automatically recorded. Prior to the installation of the electronic digital status relay system, voice radio transmission was used to communicate between the dispatched fire unit and the SJCC. Depending on the radio traffic, an accurate time would or would not be recorded. It should be noted that voice radio communication is still used for other purposes and is available as a backup in case the digital status relay system becomes inoperable.

Combined Police And EMS Events

On combined (police and fire) events, the police call-taker does not normally transfer the 9-1-1 caller to Fire Dispatch. Rather, the call-taker takes the necessary incident details and simultaneously creates police, fire, and ambulance

event records.¹⁴ The fire and ambulance events are routed simultaneously to the secondary fire dispatchers to dispatch the fire unit and to contact the County Center for the ambulance. The call is not normally routed to the primary fire dispatcher since the event is already created, and PAI is not usually given in circumstances where police are required to secure the scene. Additionally, in the case of a combined event, a fire dispatcher does not normally talk directly to the caller (reporting party), as the police dispatcher retains "ownership" of the call.

Medical Dispatch At The County Center

The County Center's normal Medical Dispatch staffing level is four people including one senior dispatcher and three medical dispatchers. The primary responsibilities of the three medical dispatch positions are as follows:

MED-1 Paramedic dispatching

MED-2 Medical call-taking and contact to SJCC

MED-3 Backup call-taking and monitoring the Med-Net radio communications

¹⁴ We found that 41 percent of the total EMS events in our sample were combined events where both fire and police units were dispatched. Of this 41 percent, 14 percent were not initially classified as an EMS event; rather, they were initially considered to be an event for police dispatch only. Thus, for 14 percent of the combined events, the call-taker did not simultaneously create police, fire, and ambulance event records. Instead, the call-taker created the police event record only, and later (often minutes later) when Fire Dispatch is notified, the fire and ambulance event records are created. Sometimes the delay in notifying Fire Dispatch of the need for EMS was due to the lack of information from the reporting party, and in other instances it is a result of SJPD and SJFD policy regarding joint response to certain types of emergency incidents. If the incident is not specified by policy to initially require joint response, and there is no other information which would suggest a combined response, only a police unit is dispatched. In other words, SJPD may initially respond to the scene and upon investigation find that an EMS response is also needed. Other times SJPD must investigate and secure the scene before SJFD is requested to dispatch a fire unit and call the County Center for an ambulance.

When the SJFD calls the County Center to inform them of the need for an ambulance, the medical call-taker sees the button for the SJCC direct telephone line light up and hears it ring.¹⁵ When the call is answered, the fire dispatcher verbally relays the incident address and nature of the medical problem to the medical call-taker. The medical call-taker then manually types the address and the description of the nature of the problem into the County Center's computer system.¹⁶ Once the call-taker verifies the location, the entered event is routed to both other medical dispatchers for paramedic dispatching and radio monitoring.

Ambulance Automatic Vehicle Locator System

In 1990, the County Center did not have an Automatic Vehicle Locator (AVL) system for its ambulances. In 1992, the medical dispatcher used the AVL to more efficiently determine the closest available ambulance for dispatch. Each ambulance includes equipment that automatically signals its location and movement to the County Center every minute. Based on the incident address (cross-referenced to computer GEO-file coordinates) and data from the AVL system, the County Center's computer suggests first, second, and third due ambulances. The medical dispatcher is able to override the system if he/she thinks a different ambulance other than the first due would actually arrive on scene sooner.

¹⁵ The first ring time and the time this line is answered at the County Center are not recorded in the County Center's Computer-Aided Public Safety System (CAPSS); thus, these times were not available to the City Auditor for the 1992 study.

¹⁶ If a computer link is installed between the City's CAD System and the County Center's CAPSS, the manual entry of the address and incident description in CAPSS would be eliminated. For a discussion of the effect on response times from installing such a link, see page 44 of this report.

The AVL displays its information in either a map or status list format for use by medical dispatchers.¹⁷ Once an ambulance has been dispatched, it relays changes in status via digital relay in the same manner as the SJFD's fire units. The County Center's medical dispatcher has voice radio communication with the paramedics in the ambulance as well.

*Significant Changes In The EMS
Dispatch Process Between 1990 And 1992*

The 1990 EMS dispatch process is diagrammed in Appendix H, while Appendix I shows the 1992 process. Significant changes from the 1990 process when the County Center handled all the City's 9-1-1 calls are detailed in Table III on the next page.

¹⁷ For a discussion of the AVL's effect on ambulance response times, see page 51 of this report.

TABLE III
COMPARISON OF 1990 AND 1992
EMS DISPATCH PROCESS FOR 9-1-1 CALLS

1990	1992	Significance Of Change
EMS Event Only		
9-1-1 call-taker transfers caller (reporting party) to either Medical or Fire Dispatch. Either dispatcher answering the transfer call can simultaneously create events for both dispatch functions.	9-1-1 call-taker transfers caller to Fire Dispatch and fire dispatcher creates event for fire unit dispatch only. Fire Dispatch relays EMS event information to Medical Dispatch by telephone. The medical dispatcher creates the event for ambulance dispatch.	Compared to 1990, in 1992 the ambulance dispatch was delayed because fire and medical events for dispatching could not be simultaneously created.
9-1-1 telephone system automatically supplies caller's telephone number and address (ANI/ALI) to pre-fill those fields on both fire and medical event records.	ANI/ALI information is not available to pre-fill fields on the medical event record when the 9-1-1 call is answered at SJCC. After creating the fire event, the fire dispatcher relays the incident address to Medical Dispatch by telephone. The medical dispatcher must manually enter the address on the medical event record.	Compared to 1990, in 1992 the ambulance dispatch was delayed because the medical dispatcher had to manually enter the event address instead of having it automatically available, and there was increased risk of error due to the incident address being misspoken or misunderstood.
Whichever dispatcher (fire or medical) initially creates the event, the description of the nature of the emergency and other incident details are automatically (electronically) available to the other dispatcher.	Fire Dispatch must verbally relay descriptive details of the EMS event to Medical Dispatch by telephone. The medical dispatcher must manually enter the details on the medical event record.	Compared to 1990, in 1992 EMS event details had to be verbally repeated instead of being automatically available, and the medical dispatcher duplicated the entry previously made by the fire dispatcher.
Combined Police And EMS Event		
9-1-1 call-taker <u>does not</u> have the capability to create fire or medical events. The call-taker creates the event for police dispatch only and then verbally relays the incident address and details by telephone to either the medical or fire dispatcher who can simultaneously create events for both dispatch functions.	9-1-1 call-taker <u>does</u> have the ability to create the fire event, but <u>not</u> the medical event. After receiving an electronic copy of the fire event, the fire dispatcher verbally relays EMS event information to Medical Dispatch. The medical dispatcher creates the event for ambulance dispatch.	In 1992, the call-taker could create an event record with sufficient information to enable dispatch of closest available fire unit at an earlier point in the process than in 1990 without having to transfer the original caller to another dispatcher or verbally repeat incident address and details.
9-1-1 telephone system automatically supplies caller's telephone number and address (ANI/ALI) to pre-fill those fields on both fire and medical event records.	ANI/ALI information is not available to pre-fill fields on the medical event record when the 9-1-1 call is answered at SJCC. After receiving an electronic copy of the fire event, the fire dispatcher relays the incident address to Medical Dispatch by telephone. The medical dispatcher must manually enter the address on the medical event record.	Compared to 1990, in 1992 the ambulance dispatch was delayed because the medical dispatcher had to manually enter the event address instead of having it automatically available, and there was increased risk of error due to the incident address being misspoken or misunderstood.
Whichever dispatcher (fire or medical) initially creates the event, the description of the nature of the emergency and other incident details are automatically available to the other dispatcher.	Fire Dispatch must verbally relay descriptive details of the EMS event to Medical Dispatch by telephone. The medical dispatcher must manually enter the details on the medical event record.	Compared to 1990, in 1992 EMS event details had to be verbally repeated instead of being automatically available, and the medical dispatcher duplicated the entry previously made by the call-taker.

In summary, in 1992 the 9-1-1 call-taker could electronically transmit EMS event information only to the SJFD fire dispatcher for dispatching a fire unit and not to the County Center's medical dispatcher for the ambulance. The SJFD fire dispatcher had to verbally convey by telephone the EMS incident address and necessary details about the nature of the emergency to Medical Dispatch at the County Center. This call to the County Center was made using a dedicated direct telephone line so the fire dispatcher needed only to push one button to be directly connected. However, when compared to 1990, in 1992 the ambulance dispatch was delayed due to (1) verbal versus electronic relay of the EMS incident address and details to the medical dispatcher and (2) duplicative manual re-entry of the address and detail information by the medical dispatcher.

FINDING I

WHEN COMPARED TO 1990, THE SAN JOSE FIRE DEPARTMENT'S DELIVERY OF EMERGENCY MEDICAL SERVICES IMPROVED, BUT TOTAL EMS RESPONSE TIMES WERE LONGER IN 1992

Both the San Jose Fire Department (SJFD) and Santa Clara County-contracted paramedics provide service to citizens at the scene of an Emergency Medical Services (EMS) event. In 1992, the SJFD provided San Jose (City) citizens with EMS services that were not available in 1990. These enhanced EMS services improve the level of emergency medical care. However, total EMS response times for both the SJFD and the County-contracted paramedics were longer in 1992 than in 1990. Specifically, our review revealed that:

- SJFD dispatchers provided Pre-Arrival Instructions giving immediate medical treatment to victims in 32 percent of its EMS events;
- The SJFD's average 1992 EMS total response time was 7 minutes 16 seconds compared to 11 minutes 32 seconds for the County-contracted paramedics;
- Compared to 1990, overall EMS call-handling, dispatch, and unit response performance resulted in SJFD taking 36 seconds longer to respond to the scene in 1992, while the County-contracted paramedics took 1 minute 3 seconds longer;
- In 1992, hospital emergency rooms treated and released 50 percent of transported EMS victims compared to 55 percent in 1990; and
- The death rate for victims transported to the hospital decreased from 0.8 percent in 1990 to 0.7 percent in 1992.

New SJFD Emergency Medical Services

SJFD personnel and equipment usually arrive at the EMS scene first and perform Basic Life Support activities until the County-contracted paramedics arrive to administer Advanced Life Support and transport the victim. The SJFD began providing Pre-Arrival Instructions (PAI) service in September 1991. When appropriate, fire dispatchers give PAI to the caller (reporting party) who is able to administer immediate basic medical treatment to the victim.³⁵ In our sample, we found that PAI was provided for 32 percent of EMS events. In these instances, the victims received some medical treatment before either the fire unit or ambulance arrived. SJFD management describes, in its own words, its accomplishments regarding PAI in a memorandum at Appendix B, page B-4.

San Jose is the only city in Santa Clara County providing PAI. Other jurisdictions in California with PAI service include Fremont, Los Angeles, San Diego, Orange County, San Joaquin County, and Santa Cruz County. The County EMS medical director approves the PAI, and a quality review board routinely reviews them.

Other enhancements to the provision of EMS in the City include the purchase of mass casualty medical trailers and heart defibrillators. After the 1989 earthquake, the City's Office of Emergency Services purchased five special medical trailers to be assigned to strategic fire stations. These specially designed trailers can transport equipment and supplies to the scene of a mass casualty incident. Each trailer contains enough medical supplies and equipment to treat 15 to 100 patients.

³⁵ Fire dispatchers are not able to provide PAI for all EMS calls. Sometimes PAI may not be possible because there is a language barrier or because the caller is not in close proximity to the victim. At other times, fire dispatchers do not provide PAI because the caller's safety may be in jeopardy or because a high volume of incoming calls for dispatching takes priority.

In addition, SJFD is proceeding with training for personnel in each of its stations so that all engine and truck companies will be able to use a heart defibrillator on patients in full cardiac arrest. As of January 1993, 16 of 29 fire stations were already on line with the defibrillation service, and the other 13 stations will be on line by June 1993.

**Compared to 1990, Both SJFD And The
County-Contracted Paramedics Took Longer In 1992
To Respond To EMS Events In San Jose**

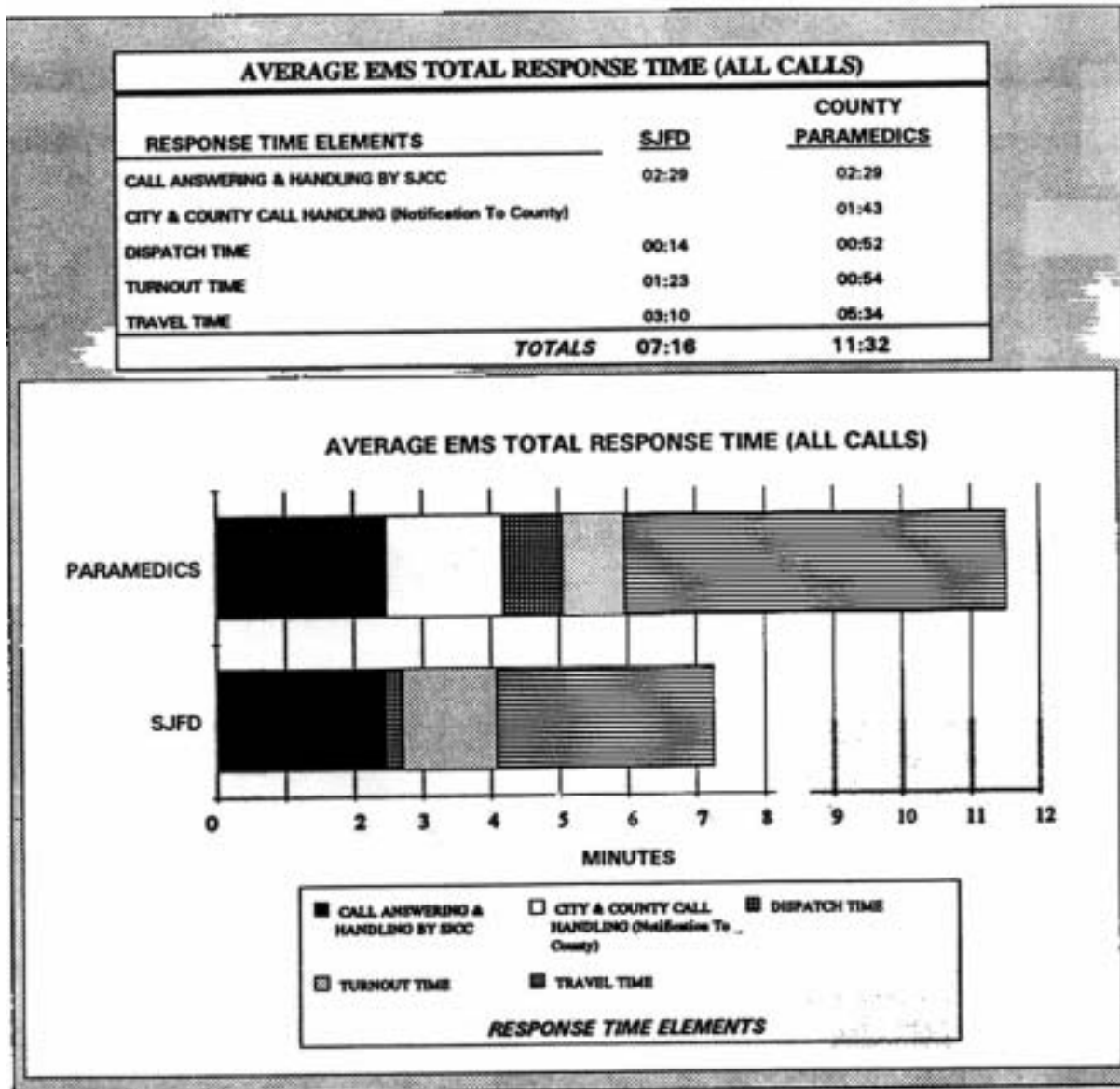
Before October 1990, 9-1-1 call-takers, County medical dispatchers and SJFD fire dispatchers were all housed in the Santa Clara County Communications Center (County Center). On October 1, 1990, the City opened its new communications center and assumed responsibility for (1) answering 9-1-1 calls originating within its jurisdiction, (2) dispatching City personnel as appropriate, and (3) notifying the County Center's Medical Dispatch if an EMS event was involved.

The 1990 EMS dispatch process is diagrammed in Appendix H, while Appendix I shows the 1992 process. Refer also to the series of graphs in Appendix G to compare how average EMS total response time differed for various types of calls. For example, SJFD's shortest average total response time occurred when the emergency was a medical event only (page G-3) and was longest when the emergency also involved dispatching a San Jose Police Department (SJPD) unit (page G-6).

In our 1992 sample, it took the SJFD an average of 7 minutes 16 seconds to respond to an EMS event; whereas, it took County-contracted paramedics an average of 11 minutes 32 seconds to respond. The time segments making up our calculated EMS total response times are shown in Graph 2.

GRAPH 2

COMPARISON OF SJFD AND COUNTY-CONTRACTED PARAMEDIC AVERAGE EMS TOTAL RESPONSE TIME



SJFD's average 1992 EMS total response time of 7 minutes 16 seconds may be somewhat skewed by the inclusion of seven combined events that were initially classified as police only, yet after police investigation were determined to also need EMS response. (See footnote 14 on page 33 of this report.) The result of including these seven events among the total 297 events for which overall average times were calculated primarily has the effect of showing longer call-answering and call-handling times for SJCC than without them.

For example, refer to Appendix G, page G-4 to see average EMS total response time for all 9-1-1 calls in our sample that were combined events. See also pages G-5 and G-6 for average EMS total response times broken out for the two different subcategories of combined events. In the graph at G-5, events combined from the outset (police and EMS response together) had total average SJCC call-answering and call-handling time of 2 minutes 31 seconds, while those combined later as shown on G-6 (police first, EMS later) averaged 7 minutes 40 seconds. The call-answering and call-handling segment was longer for the second category of combined events (G-6) since this segment included the time required for police investigation prior to determining the need for an EMS response.

It should be noted that both SJPD and SJFD officials believe it is inappropriate to include the combined events shown in G-6 in the overall average EMS total response time shown in Graph 2. However, the effect of including the events graphed on page G-6 in the overall average EMS total response time is

minimal because these seven events represented only 2.4 percent of our total sample of 297 events.³⁶

As shown in Graph 2, the time segment that accounts for the biggest difference between overall SJFD and County-contracted paramedic response time is travel time. Our sample results were that SJFD's travel time was 3 minutes 10 seconds on average while the paramedics' travel time was 5 minutes 34 seconds. Average SJFD travel time was remarkably consistent on different days of the week, varying only 13 seconds averaged on a City-wide basis. The paramedics' travel times were more subject to variation from one day of the week to another, the average varying by as much as 53 seconds.

During our 1990 review of EMS, we predicted that the conversion to the new SJCC could very likely result in County-contracted paramedics taking longer to respond to EMS events in the City. We found this to be true in our 1992 sample with the paramedics arriving 1 minute 3 seconds slower (refer to Appendix E). Further, we have determined that, in part, the slower paramedic response times were due to 1992 average call-handling time being 39 seconds longer than in 1990 to process calls from time of 9-1-1 call-answer to when the fire dispatcher completed the fire unit dispatch. All or most of this extra 39

³⁶ As we can see, the SJCC call-answering and -handling segment on page G-4 (9-1-1 calls answered by SJCC, combined with police) is 2 minutes 48 seconds; whereas, the same segment on page G-5 (9-1-1 calls answered by SJCC--police and EMS response together) is 2 minutes 31 seconds. The effect of the events graphed on page G-6 (9-1-1 calls answered by SJCC--police first, EMS later) being included on page G-4 is to make the call-answering and -handling segment 17 seconds longer. However, the ultimate effect of including the G-6 events in the overall average EMS total response time (GRAPH 2) is something less than 17 seconds because the number of combined events graphed on page G-4 is 92 events; whereas, GRAPH 2 includes our total sample of 297 EMS events. We approximate that the effect of including the page G-6 events in GRAPH 2 is to lengthen SJCC call-answering and -handling time by 5 seconds on a proportional basis ($92/297 = 31$ percent and 31 percent of 17 seconds = 5 seconds).

seconds in the 1992 process was a result of fire dispatchers verifying locations³⁷ and obtaining more incident details to assess for PAI. The remaining 24-second increase in paramedic response times from 1990 to 1992 appeared to be due to the lack of a computer link between the SJCC and the County Center.

Since 1991, at the direction of the City Council, City officials have been negotiating with the County Center's management regarding the installation of a computer link between the two communication centers. To date, the link has not been installed. According to City officials, the County Center's management has been reluctant to agree to two-way data transmission or to pay any part of the cost. However, according to County Center officials, they have indicated their willingness to proceed with this project, but advise they are still waiting for the City to confirm its CAD system can be modified to route or accept dispatch computer data.

Nonetheless, in its proposed 1993-94 operating budget, the City's Information Systems Department included \$55,770 for purchasing the hardware and software and leasing the data line necessary for the CAD to CAPSS link. Of the total cost, \$54,600 is for one-time hardware installation and software upgrade. In our opinion, a \$54,600 one-time and \$65 per month ongoing costs are a minimal amount to pay to improve paramedic response times by at least 24 seconds and possibly by more than 1 minute.

³⁷ For the EMS events that do not also involve dispatch of police (59 percent), the primary fire dispatcher verifies the incident location instead of the 9-1-1 call-taker.

A computer link between the SJCC and the County Center would not only eliminate the 24 seconds needed to relay and input the victim's address, but also the time required to relay and input the details about the nature of the incident. In addition, a computer link would eliminate current transmission errors such as "forgetting to call for the ambulance" or misspoken and misunderstood information verbally relayed between City fire dispatchers and County medical dispatchers. It should be noted that two-way data transmission is desirable because the City accounts for 64 percent of all County Center EMS dispatches, and conversely, the County Center is the reporting party to the SJCC for 10 percent of the SJFD's EMS dispatches.

**Hospital Emergency Rooms Treated And Released
50 Percent Of Transported EMS Victims**

We investigated and summarized the hospital emergency room disposition for the 147 EMS victims the County-contracted paramedics transported in our sample.³⁸ Of these 147 EMS victims, the hospital emergency room treated and released 73 patients, or 50 percent, compared to 55 percent in our 1990 sample. Table IV summarizes the hospital emergency room dispositions for the 147 EMS victims that paramedics transported.

³⁸ Due to a County Health Department system problem, information on hospital transports was available for only two of the three days included in our sample.

TABLE IV
HOSPITAL EMERGENCY ROOM DISPOSITIONS
FOR TRANSPORTED EMS VICTIMS

<u>Disposition:</u>	<u>Number Of</u> <u>Calls</u>	<u>Percentage</u> <u>Of Transports</u>
Treated And Released	73	49.7%
Unknown	38	25.8%
Admitted	34	23.1%
Transferred To Other Hospital	1	0.7%
Died In Emergency Room	<u>1</u>	<u>0.7%</u>
TOTAL PATIENT TRANSPORTS	<u>147</u>	<u>100.0%</u>

We could not determine the hospital emergency room disposition for 38 of the EMS victims that County-contracted paramedics transported because the hospital did not complete that portion of the Pre-hospital Care Report (PCR). Compared to 1990, fewer victims were admitted to the hospital in 1992 (24.9 percent in 1990 versus 23.1 percent in 1992), but the percentage of unknown dispositions increased (18.5 percent in 1990 versus 25.8 percent in 1992).

According to the hospital disposition codes, only one EMS victim in our sample died. This represents a death rate of 0.7 percent for all victims transported to the hospital. In 1990, the death rate was slightly higher at 0.8 percent of all transported victims. Although total EMS response times were longer for both the SJFD and the County-contracted paramedics in 1992 when compared to 1990, the death rate for EMS victims was slightly less in 1992.

CONCLUSION

New EMS services in 1992 improved the level of EMS care for the citizens of San Jose, yet total response times for both the San Jose Fire Department and the County-contracted paramedics were longer in 1992 than in 1990. The City and the County can shorten total EMS response times and minimize the possibility of error in the relay of emergency dispatch information by installing a computer link between the San Jose Communications Center and the Santa Clara County Communications Center.

RECOMMENDATION

We recommend that the San Jose Police Department and San Jose Fire Department coordinate with the City's Information Systems Department and the Santa Clara County Communications Center to:

Recommendation #1:

Install a computer link between the San Jose Communications Center and the Santa Clara County Communications Center for two-way transmission of emergency medical event dispatch information. (Priority 2)

Recommendations Requiring Budget Action

The preceding recommendation cannot be implemented absent additional funding. Accordingly, subject to City Council approval of this recommendation, the City Manager should include in the City Manager's 1993-94 Proposed Operating Budget for the Informations Systems Department an amount sufficient to implement Recommendation #1. The amount estimated to implement this recommendation is \$55,770. This includes a one-time expense of \$54,600 for computer hardware and software and \$1,170 for the first 18 months of monthly data line lease. On-going costs, estimated at \$65 a month for the data line lease, should be provided for in the General Services Department budget after the first 18 months.

FINDING II

**OVERALL, THE COUNTY IMPROVED ITS AMBULANCE
RESPONSE TIME IN 1992 WHEN COMPARED TO 1990,
BUT COUNTY-CONTRACTED PARAMEDIC EMS RESPONSE
IN THE SAN JOSE FIRE RESPONSE AREA STILL
DID NOT MEET THE COUNTY STANDARD FOR RESPONSE TIME**

The Santa Clara County Communications Center (County Center) is the primary Public Safety Answering Point (PSAP) for 9-1-1 calls originating within the unincorporated areas of Santa Clara County (County), some of which are in the San Jose fire response area. In addition, the County Center answers calls to the 7-digit ambulance emergency telephone number, some of which come from the city of San Jose (City) or its contracted fire response area. During our review, we found:

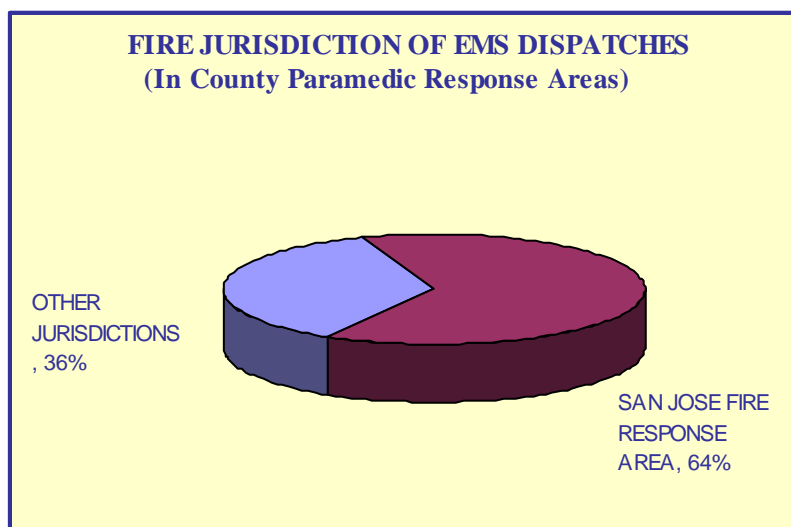
- Emergency Medical Services (EMS) events in the San Jose fire response area accounted for 64 percent of total paramedic dispatches from the County Center;
- The County Center was the reporting party to the San Jose Fire Department (SJFD) for 10 percent of total EMS events in the San Jose fire response area;
- The combined turnout and travel time for the County-contracted paramedics improved greatly from 1990 to 1992, being 1 minute 14 seconds faster in 1992;
- 88 percent of the time the paramedics arrived at their dispatch destinations in the San Jose fire response area in less than 10 minutes, just under the County standard of 90 percent;
- 30 percent of ambulance dispatches still resulted in "dry runs" with no victim transported to the hospital; and

- Despite the fact that all of the EMS events in our sample were dispatched Code 3 to the scene, only 15 percent of the hospital transports were Code 3 to the hospital.

Fire Jurisdiction Of County EMS Dispatches

The City and its fire response area under County contract continue to account for the majority of EMS dispatches in the County. Graph 3 illustrates that 64 percent of the EMS events to which County Center-dispatched paramedics responded were in the San Jose fire response area.³⁹

GRAPH 3

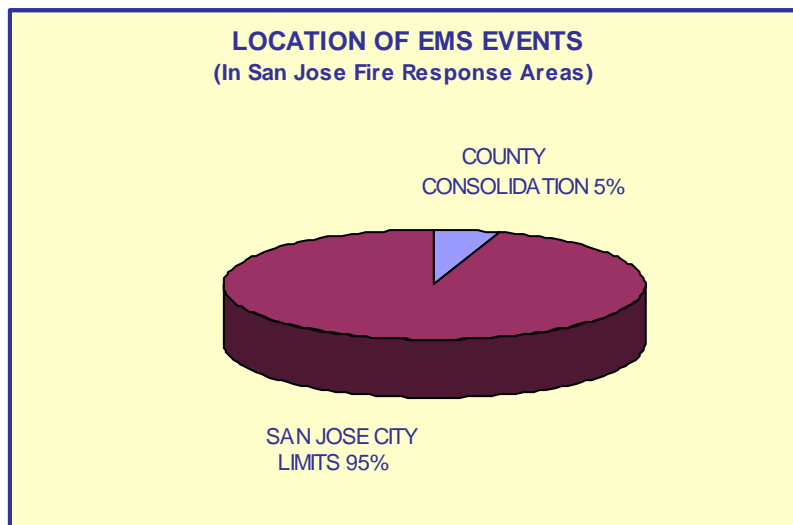


³⁹ Excludes events in Campbell and Palo Alto because they have their own paramedics; thus, the County Center does not handle EMS dispatching for these cities.

Further, the County Center is the PSAP for answering 10 percent of the EMS calls to which the SJFD responds. Thus, for these EMS events, the County Center becomes the reporting party to the SJCC. Similar to the process described at the top of page 34 of this report, the County Center's medical dispatcher must contact the SJCC via direct telephone line to verbally relay the event location and necessary details to a fire dispatcher so that a fire unit can be dispatched as the first responder.

Finally, as shown in Graph 4, the location of the EMS events to which the SJFD responded were 95 percent within San Jose city limits and 5 percent within County consolidation areas.⁴⁰

GRAPH 4



⁴⁰ The County has contracted with the City to include County consolidation areas in San Jose's fire response area.

New Vehicle Locator System And Electronic Digital Status Signaling Improved Paramedic Response Times

In our 1992 sample, the combined turnout and travel time for the County-contracted paramedics averaged 6 minutes 28 seconds compared to 7 minutes 42 seconds in 1990. The paramedics improved their turnout time by 28 seconds and their travel time by 46 seconds for an overall response time 1 minute 14 seconds faster in 1992 than in 1990.

The significant improvement in the paramedic response time is a result of three different factors:

1. A new Automatic Vehicle Locator (AVL) system aids County Center medical dispatchers in better locating an ambulance closest to the incident location.
2. A new electronic digital status signaling system allows for more timely and accurate recording of ambulance en route and arrival times compared to voice radio communication in 1990.
3. A change in the method of calculating ambulance response time more accurately measures the turnout portion of response time by excluding the time it takes the medical dispatcher to relay the incident location to the paramedics. This element of response time is now more accurately included in the dispatch time element.⁴¹

⁴¹ However, this element is not necessarily more accurate unless the paramedics respond immediately to the "ring down" from the County Center. During hours when the paramedics are sleeping, more time is taken for them to contact the County Center and accept the dispatch. (See *Call-Handling By County Center Medical Dispatch Personnel* and *Dispatch Time* on page 26 of this report.)

**Despite System Improvements And Performance
Measurement Changes, The County-Contracted Paramedics'
1992 EMS Response In The San Jose Fire Response Area
Did Not Meet The County Standard For Response Time**

We analyzed whether County-contracted paramedic EMS responses in the San Jose fire response area were within the response time standard specified in the County contracts. The contract for each of the paramedic service providers requires that 90 percent of responses to Code 3 "urban" dispatch destinations shall be in less than 10 minutes after dispatch notification.⁴²

We could not check for compliance with the County contract because the contract-required response time applies to each of the two paramedic service providers in their designated response zones only. The contract response time requirement does not apply County-wide, nor does the contract require that the paramedics meet the standard response time in each city's jurisdiction. Also the contract does not clearly define what locations are considered urban versus non-urban, and the County's paramedic dispatch records used in our sample do not indicate whether the incident location is in an urban or non-urban area.⁴³

However, we did want to analyze the County-contracted paramedics' response time for the 297 events in our sample to compare their performance to the

⁴² The County's contract requirement covers both the ambulance turnout and travel time response segments shown in DIAGRAM I on page 24 of this report.

⁴³ When the County Health Department upgrades their computer system and database for EMS monitoring, they plan to specifically code each geographic location as urban or non-urban. However, in the interim, the County Health Department and the paramedic service providers have agreed to designate all unincorporated areas of the County as non-urban. Thus, the unincorporated non-urban response area as currently designated may include some unincorporated pockets geographically situated within incorporated cities such as San Jose. For example, some of the EMS responses in our sample were to unincorporated County consolidation areas for which the County has contracted with the City to include in San Jose's fire response area, yet ultimately these areas will most likely be coded as "urban" in the County's database.

contract-specified standard. For our purposes, we applied the contract-specified response time standard for urban area responses to all the events in our sample.⁴⁴ Thus, assuming that all of the 297 EMS events in our sample were in urban areas, we found that the paramedics' response time was less than 10 minutes for 88 percent of the 263 dispatches that arrived at the scene compared to the standard of 90 percent.

In 1990, we found that the paramedics arrived at their dispatch location in less than 10 minutes 79 percent of the time. However, it should be noted that the paramedic response times in 1992 and 1990 are not comparable because the County changed its method of calculating ambulance turnout time, as noted on page 51 of this report. For example, if we used the 1990 method to calculate County-contracted paramedic response times in 1992, the response times would have been less than 10 minutes only 83 percent of the time.

A Significant Number Of EMS Dispatches Did Not Result In Victims Being Transported To The Hospital, And Most Transports Were Not Code 3 To The Hospital

There are times when both SJFD personnel and County-contracted paramedics respond to an EMS call but do not provide any treatment or transport. When paramedics do provide medical treatment, they identify the specific treatment provided on a Pre-hospital Care Report (PCR). This information later becomes part of the patient's medical record. If the EMS call results in the paramedics not transporting a victim to the hospital, the paramedics code the EMS

⁴⁴ It should be noted that our sample included all Code 3 dispatched EMS events in the San Jose fire response area on the days selected for analysis, except as noted on page 6 in the Scope and Methodology section of this report under the description of our sample selection criteria.

call as a "dry run" on the PCR. Our sample results showed that 30 percent of County-contracted paramedic EMS calls resulted in a dry run.

The reasons for a paramedic dry run, as well as the frequency of occurrence in our sample, are shown in Table V.

TABLE V
SUMMARY OF PARAMEDIC DRY RUNS

<u>Dry Run Code Descriptions</u>	<u>Number Of Calls</u>	<u>Percentage Of Dry Runs</u>
Canceled By Public Agency	44	50.0%
Patient Refused Transport	21	23.9%
Transported By Police Agency	7	8.0%
Canceled, Patient Not Seen By Paramedics	6	6.8%
Canceled By Reporting Citizen	4	4.5%
Unable To Locate Patient	4	4.5%
Transport By Private Or Other Means	<u>2</u>	<u>2.3%</u>
TOTAL DRY RUN CALLS	<u>88</u>	<u>100.0%</u>

"*Canceled By Public Agency*" was the most frequent reason for an ambulance dry run, representing 50 percent of paramedic dry runs. This occurs when the paramedics are en route, but either do not arrive at the EMS scene or leave after arriving at the scene because police, fire, or other public agency personnel tell the paramedics they are not needed. "*Canceled By Public Agency*," along with "*Patient Refused Transport*," accounted for approximately 74 percent of all paramedic dry runs.

Considering the significant number of dry runs, we analyzed the nature of all EMS events using initial County Center medical dispatcher and subsequent paramedic descriptions of the nature of the incidents. On the basis of the initial reporting party description of the emergency, the County Center dispatcher enters a code number on the CAPSS event screen to describe the type of medical

emergency. The paramedics subsequently indicate the nature of the incident on the PCR form which the receiving hospital later forwards to the County Health Department EMS administration for entry into its database of EMS events.

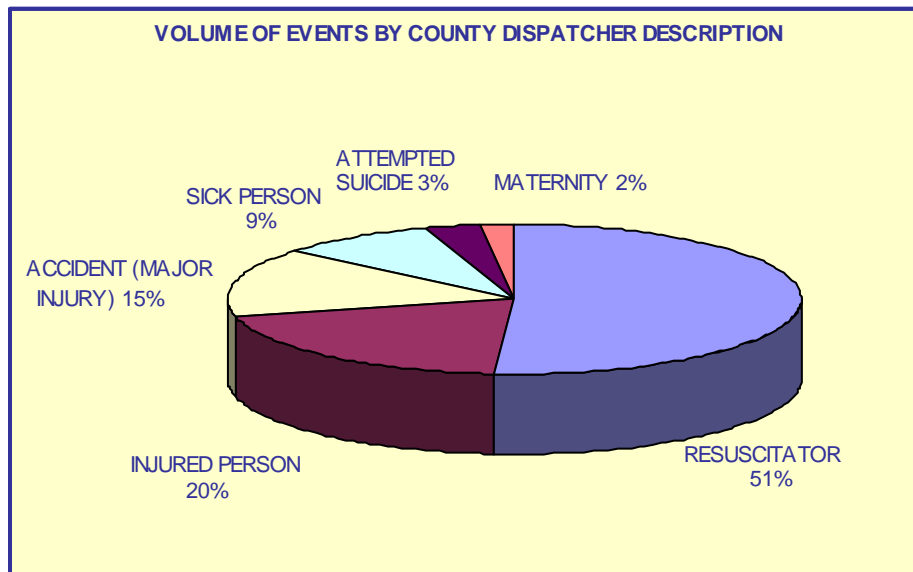
Table VI and Graph 5 show the six descriptions County Center dispatchers used for the EMS events in our sample.

TABLE VI

COUNTY DISPATCHER DESCRIPTION OF SAMPLED EMS EVENTS

<u>Description:</u>	<u>Number Of Events</u>	<u>Percentage</u>
Resuscitator	152	51%
Injured Person	60	20%
Accident (Major Injury)	45	15%
Sick Person	26	9%
Attempted Suicide	8	3%
Maternity	<u>6</u>	<u>2%</u>
TOTAL	<u>297</u>	<u>100%</u>

GRAPH 5



The PCR has 11 "*NATURE OF INCIDENT*" categories for EMS calls. It should be noted that PCR information is usually available only for those EMS calls that result in paramedics providing medical treatment to a victim at the scene or transporting them to a hospital.⁴⁵ On the two days in our sample for which we had PCR information, there were 209 EMS events and we had 147 events that resulted in a victim transport.⁴⁶ The remaining 62 events on these two days were dry runs.

In our sample of 147 EMS victim transports, County-contracted paramedics categorized more than half as either "*Medical*" problems or "*Traffic*" incidents. Table VII shows the number and percentage of transports for each of the 11 PCR "*NATURE OF INCIDENT*" categories. This same information is shown in Graph 6.

⁴⁵ County-contracted paramedics complete PCR forms for treated victims who are not transported to a hospital and forward the forms to the County Health Department. For transported victims, the hospital completes the PCR forms and forwards them to County Health.

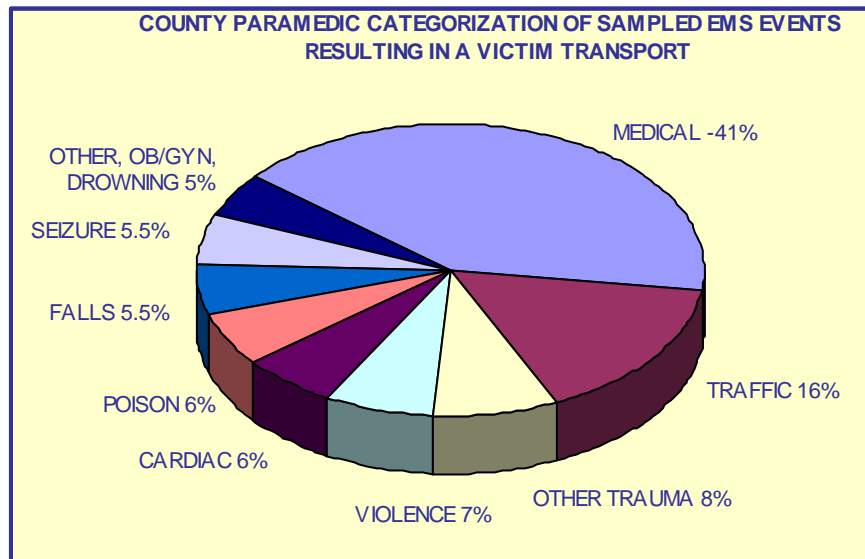
⁴⁶ We were unable to obtain PCR information for one of the three days in our sample because of a computer system problem at the County Health Department.

TABLE VII

COUNTY PARAMEDIC CATEGORIZATION OF EMS EVENTS

<u>Nature Of Incident</u>	<u>Number Of Transports</u>	<u>Percentage Of Transports</u>
Medical	60	41.0%
Traffic	24	16.0%
Other Trauma	11	8.0%
Violence	10	7.0%
Cardiac	9	6.0%
Poison	9	6.0%
Falls	8	5.5%
Seizure	8	5.5%
Other	6	4.0%
OB/GYN	2	1.0%
Drowning	<u>0</u>	<u>0.0%</u>
TOTAL	<u>147</u>	<u>100.0%</u>

GRAPH 6



County Center dispatchers initially described EMS events as "*Resuscitator*" problems most frequently (51 percent of total events). However, County-contracted paramedics categorized the nature of the incident for victims transported as "*Medical*" problems most frequently (41 percent of transports).

Finally, we looked at the severity of EMS incidents based on the ambulance response code to the hospital. Although all the EMS events in our sample were initially dispatched as Code 3 (emergency, use red light and siren), the actual nature of the emergency at the scene was often found to be less severe. As a result, for most of the events in our sample we found that the ambulance response code to the hospital was Code 2 (urgent, no red light or siren). Specifically, we found that 85 percent of victims transported went to the hospital without red lights and siren.

CONCLUSION

The majority of Santa Clara County's paramedic EMS dispatches continue to be for citizens of San Jose. Most of the time when victims are transported to the hospital, the nature of the emergency is such that it is not serious enough to warrant going Code 3 with red lights and siren. In 1992, the County-contracted paramedics still did not meet the County standard for response time, but their performance has improved since 1990.

FINDING III

THE SAN JOSE POLICE DEPARTMENT MET ONE OF ITS TWO 9-1-1 CALL-ANSWERING TIME OBJECTIVES

The San Jose Police Department (SJPD) has the responsibility to answer all 9-1-1 calls originating in the city of San Jose (City). For 1992-93, the SJPD Bureau of Technical Services has two 9-1-1 call-answering time objectives. Our review revealed that:

- Citizens called 9-1-1 to report 77 percent of total Emergency Medical Services (EMS) incidents in the San Jose fire response area;
- The percentage of calls for EMS from non-9-1-1 sources dramatically increased from 3 percent in 1990 to 23 percent in 1992;
- SJPD call-takers answered 62 percent of incoming 9-1-1 calls within 10 seconds, well below their objective of 90 percent;
- The overall average SJPD 9-1-1 call-answering time was 13 seconds, which was 2 seconds faster than the SJPD's objective of 15 seconds; and
- 41 percent of the time, the nature of the EMS incident resulted in SJPD call-takers creating "combined" events which were routed to both fire and police dispatchers.

Dramatic Increase In The Volume Of Non-9-1-1 Calls

All emergency and non-emergency requests for police, fire, and ambulance services are processed through the San Jose Communications Center (SJCC). The most surprising result of our review was that the percentage of calls for EMS from non-9-1-1 sources dramatically increased from 3 percent in 1990 to

23 percent in 1992. According to the SJPD and SJFD officials, there may be several reasons for the change including:

- An increase in the reluctance of some sectors of the diverse ethnic community to use 9-1-1;⁴⁷
- An increase in the number of people calling 7-digit emergency telephone numbers because they experience slow 9-1-1 call-answering;⁴⁸
- An increase in the referrals from police officers in the field and other City workers who observe the need for EMS; and
- An increase in the people using cellular phones to report accidents to the CHP which in turn directly notifies the SJCC, thus bypassing the 9-1-1 system.

The high volume of non-9-1-1 calls is significant for the SJPd because Pacific Bell's enhanced 9-1-1 ANI/ALI system cannot be used to automatically identify the incident location for these calls. For a non-9-1-1 call, the call-taker must always ask the reporting party (caller) for the incident location and manually enter it into the Computer-Aided Dispatch (CAD) system.

For the 9-1-1 calls the Santa Clara County Communications Center (County Center) answers that originate from an unincorporated area of Santa Clara County (County), the County Center currently calls the SJCC, via a direct telephone line, and requests dispatch of a fire unit.⁴⁹ However, for our sample, we categorized

⁴⁷ SJPd is now in production with multilingual public television ads to educate the community about 9-1-1 service. Officers have reported a number of non-English-speaking citizens admitting their reluctance to use 9-1-1. For example, some callers believe that having their address identified by the 9-1-1 ANI/ALI system may result in discovery of their status as illegal aliens or may result in reprisals such as from Vietnamese "home invasion" gangs if there is a record of them as the reporting party.

⁴⁸ Our sample results showed that the SJPd answered only 62 percent of incoming calls within 10 seconds. After 10 seconds, the call is answered by the system (i.e., the caller hears a pre-recorded message to hold for the human call-taker). Thus, frustrated callers may hang up or call-back on a non-9-1-1 line. (See page 28 in this report for a description of the SJPd's abandoned call call-back program.)

⁴⁹ Currently, the SJFD dispatcher manually enters the incident address for County Center-answered 9-1-1 calls because the SJCC lacks a computer link with the County Center as discussed on page 44 in this report. However, if

those 9-1-1 calls the County Center answered as well as those the SJCC answered as 9-1-1 calls.

The 9-1-1 Call-Taking Process At The SJCC

In 1990, the County Center's total 9-1-1 call-answering and call-handling times were unknown because the time of the first ring was not recorded in its computer dispatch system. However, County Center officials in 1990 estimated that it took primary call-takers approximately 6 seconds to answer an incoming 9-1-1 call.⁵⁰

We found that SJPD call-takers answered 9-1-1 calls within 13 seconds on the average and answered 62 percent of all 9-1-1 calls in 10 seconds or less. While the 13-second average call-answering time was within the SJPD's objective of 15 seconds, the 62 percent of calls answered within 10 seconds is far below the SJPD's 90 percent objective.

According to SJPD officials, in 1993-94, the Department will lower its average 9-1-1 call-answering objective from 15 seconds to the 10-second standard

a computer link were installed for two-way data transmission, the 9-1-1 system-supplied address would be electronically transmitted from the County Center to the SJCC.

⁵⁰ City officials advise this is the equivalent of answering a call on the first ring because a phone ring cycle is 6 seconds: 2 for the ring and a 4-second pause before the next audible ring. However, according to County Center officials, their Center's experience and equipment show that there are two audible rings in 6 seconds.

the state of California recommends.⁵¹ With 14 new dispatchers (12 of whom are 9-1-1 call-takers) on the line as of late November 1992, the SJCC should improve its performance on both of its 9-1-1 call-answering objectives. In reviewing SJPD performance objectives, we found that the SJPD does not currently have call-handling time performance objectives for either transferring the EMS only calls to the Fire Dispatch Room or for notifying Fire Dispatch on combined events.

We should point out that the call-taking process is different when the incoming EMS call is of a nature that also requires police dispatch. In our sample, 41 percent of total EMS events also had police units dispatched to the scene of the emergency. The diagram in Appendix I shows the SJCC's dispatch process for an EMS only call as well as the process for a combined EMS and police event. Details of how the process differs for the two subcategories of combined events are described in footnote 14 on page 33 in this report.

In addition, SJPD officials discuss their Communications Division accomplishments in the provision of EMS in a memorandum at Appendix B, Page B-1.

CONCLUSION

The San Jose Police Department (SJPD) call-takers answer a variety of EMS calls from 9-1-1 and non-9-1-1 sources. For our EMS sample, the SJPD met one of its two call-answering response time objectives. Recent SJPD staff increases at

⁵¹ It should be noted that the County Center's performance standard for call-answering is 6 seconds. According to Center officials, recent performance statistics for December 1992 and January 1993 show that Center call-takers averaged 4.11 seconds and 3.78 seconds respectively.

the San Jose Communications Center should improve the Department's call-answering performance. To determine if the length of the call-handling time segment could be shortened, the SJPD should set some performance time objectives for handling both EMS only and EMS combined with police events.

RECOMMENDATION

We recommend that the San Jose Police Department:

Recommendation #2:

Set call-handling performance objectives for EMS only and EMS combined with police events. These objectives should state the average time from call answer to when Fire Dispatch is notified and/or the percentage of calls that should be handled within a certain length of time. (Priority 3)

FINDING IV

THE SAN JOSE FIRE DEPARTMENT MET ONE OF ITS FOUR CALL-HANDLING AND RESPONSE TIME OBJECTIVES

The San Jose Fire Department (SJFD) is the designated first responder to Emergency Medical Services (EMS) events within the San Jose fire response area. In addition, for 1992-93, the SJFD Bureau of Support Services has two EMS call-handling time objectives and the SJFD Bureau of Field Operations has two response time objectives. Our sample results revealed that:

- SJFD dispatchers answered 87 percent of 9-1-1 calls transferred to them by San Jose Police Department (SJPd) call-takers within 15 seconds, falling 3 percent short of their goal of 90 percent;
- In 1992, the SJFD arrived before the Santa Clara County-contracted paramedics 92 percent of the time to the scene of an EMS event compared to 86 percent in 1990;
- The first due station responded to an EMS call within its response area 93 percent of the time compared to 95 percent in 1990;
- 12 percent of the SJFD's 1992 EMS dispatches resulted in "dry runs," significantly down from 20 percent in 1990;
- City-wide, the SJFD met its turnout time objective of no more than 2 minutes for 90 percent of EMS events, achieving 92 percent;
- However, 10 of 29 fire stations did not meet the SJFD's turnout time objective of not exceeding 2 minutes for 90 percent of EMS events;
- City-wide, the SJFD nearly met its travel time objective of 4 minutes or less for 80 percent of EMS events, achieving 78 percent; and
- 16 of 29 fire stations did not meet the travel time objective of 4 minutes or less for 80 percent of EMS events.

SJFD Dispatchers Nearly Met Their Call-Answering Time Objective; However, Their Performance For The Call-Handling Time Objective Could Not Be Measured

SJFD's objective is to answer 90 percent of 9-1-1 call transfers from the SJPD within 15 seconds. In our sample, the fire dispatchers answered 87 percent of the calls within 15 seconds, nearly meeting the objective. The average SJFD call-answering time was 10 seconds.

A second SJFD objective is to dispatch the first due fire unit within 2 minutes after Fire Dispatch receives the call transfer from the SJPD call-taker for 90 percent of EMS events. We were unable to accurately measure SJFD's actual performance for this objective in our sample of events since we could not easily distinguish what portion of total call-handling time was police dispatcher call-handling and what was fire dispatcher call-handling.

As a result of conducting this audit, we discovered that two time fields on the CAD system fire event log do not exclusively indicate call-handling activity by fire dispatch personnel. In fact, for many of the combined events in our sample, these times marked a portion of call-handling that was actually performed by police dispatch personnel. Further, we found that SJFD officials have relied on management reports that also do not accurately segregate the SJFD's call-handling activities from those of SJPD. Because of the commingling of these times, the SJFD must change its computer programming to produce accurate management reports.

Furthermore, according to SJFD officials, only a minimal number of management reports are available from the CAD system for the Department.

While the SJFD has considerable event data available to it, much of this data is not captured or displayed in usable management reports.

According to SJFD personnel, the Information Systems Department modified the old reporting system to work with the SJCC's CAD data instead of the County Center's CAPSS data. However, the new reporting system design focused on meeting SJPD's communication data requirements, not the SJFD's. As a result, SJFD officials claim that the basic management reporting system component of the new CAD system meets only their minimum data requirements. Accordingly, the SJFD is working to design management reports that satisfy its EMS event data recording and reporting requirements.

The SJFD Arrived Before The County-Contracted Paramedics 92 Percent Of The Time

The SJFD is the designated first responder in its fire response area.⁵² As first responder, SJFD personnel and equipment arrive at an EMS scene to make a medical assessment and provide Basic Life Support before the County-contracted paramedics arrive. EMS events are still the vast majority of SJFD's dispatch workload, accounting for 71 percent of all dispatches, up from 65 percent in 1990.

Our sample results showed that when both the SJFD and County-contracted paramedics arrived at the same EMS scene, SJFD personnel and equipment arrived before the paramedics 92 percent of the time. By way of comparison, in 1990, the SJFD arrived first at the scene 86 percent of the time.

⁵² This includes unincorporated areas of Santa Clara County that are consolidated in the San Jose fire jurisdiction under a 1977 First Responder Agreement with the County.

Sometimes the SJFD unit first responding to the scene of an EMS event is not from the first due station. When this happens, the unit is responding outside its station's response area. For 277 of 297 (93 percent) EMS events in our sample, the first responding unit was responding from its own station area. Thus, for only 7 percent of EMS events in our sample, a unit from the first due station was unable to respond.

Table VIII on the next page shows how often each fire station responded out of its response area or was unable to respond as the first due station.

TABLE VIII

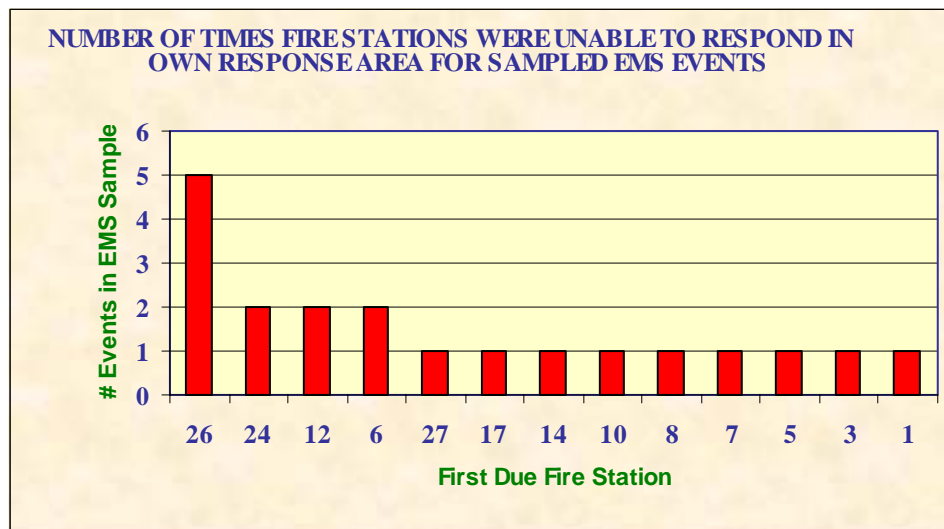
**NUMBER OF TIMES FIRE STATIONS
RESPONDED OUT OF STATION AREA OR
WERE UNABLE TO RESPOND AS FIRST DUE STATION**

Fire Responding Unit From Station Number	Number of Calls To Which Station Responded	Number Of Calls Station Was First Due Station	Number Of Calls The Station Responded To Out Of Its Station Area	Number Of Calls The Station Was Unable To Respond To As The First Due Station
1	26	26	1	1
2	25	24	1	0
3	24	23	2	1
4	14	11	3	0
5	11	12	0	1
6	7	9	0	2
7	5	6	0	1
8	20	20	1	1
9	14	13	1	0
10	9	10	0	1
11	3	3	0	0
12	4	6	0	2
13	10	9	1	0
14	14	15	0	1
15	2	2	0	0
16	21	18	3	0
17	8	9	0	1
18	16	12	4	0
19	6	6	0	0
20	2	2	0	0
21	4	4	0	0
22	4	4	0	0
23	6	6	0	0
24	13	14	1	2
25	1	1	0	0
26	20	24	1	5
27	4	5	0	1
28	3	3	0	0
29	1	0	1	0
TOTAL	297	297	20	20

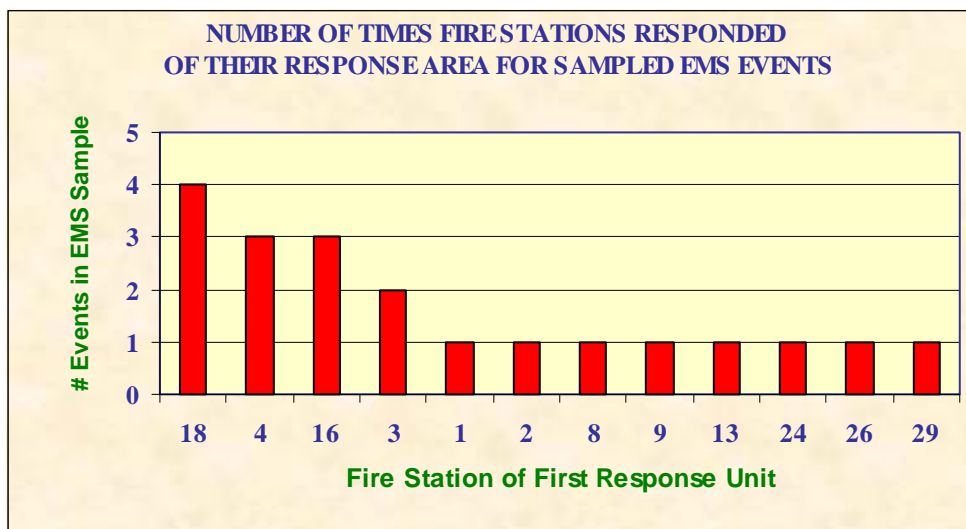
As shown in Table VIII, Fire Station 18 most often responded to EMS calls outside its response area (4 times) while Fire Station 26 was most often unable to be the first responder to calls within its own response area (5 times).

Graph 7 displays the number of times fire stations were unable to be the first responder to EMS calls in their own response area. Graph 8 displays the number of times fire stations responded to EMS calls outside their response area.

GRAPH 7



GRAPH 8



Significant Decline In SJFD Dry Runs

For the SJFD, we considered a dispatch to be a "dry run" when the fire unit was canceled before it arrived or if it arrived at the scene and found that no medical emergency existed. Based upon our sample, we observed a significant decline in the SJFD dry run rate from 20 percent in 1990 to only 12 percent in 1992. In our opinion, the reduction in the percentage of dry runs from 1990 to 1992 was due in large part to the skill of the City's 9-1-1 call-takers and the time they took to obtain accurate information up front before initiating an EMS dispatch.

On A City-Wide Basis, The SJFD Met Its EMS Turnout Time Objective But Not Its Travel Time Objective

The SJFD has two 1992-93 Bureau of Field Operations program performance objectives that apply to EMS responses. These performance objectives are:

- Turnout time will not exceed 2 minutes for 90 percent of responses.
- Travel time for the first arriving unit will not exceed 4 minutes for 80 percent of emergency responses.

Our sample results showed that the SJFD met its turnout time objective on a City-wide basis. Turnout time did not exceed 2 minutes for 92 percent of our sampled EMS responses; however, some individual fire stations did not meet the 90 percent within 2 minutes turnout time goal. Specifically, 10 of 29 stations did not meet the 2-minute goal. In addition, City-wide, the SJFD fell 2 percent short of meeting its EMS travel time objective of 80 percent of EMS responses not exceeding 4 minutes. Furthermore, 16 of 29 fire stations did not meet the SJFD's travel time objective.

Graph 9 shows by fire station the percentage of EMS responses in our sample that had turnout times of 2 minutes or less and travel times of 4 minutes or less. Specifically, Graph 9 shows that Fire Stations 5, 6, 7, 17, 19, 20, 23, 24, 25, and 27 did not meet the 2-minute turnout time response objective while Fire Stations 4, 9, 10, 12, 13, 14, 18, 20, 22, 23, 24, 25, 26, 27, 28, and 29 did not meet the 4-minute travel time objective.

Table IX compares 1990 to 1992 performance by fire station for both turnout time and travel time objectives. Specifically, Table IX shows Fire Stations 2, 3, 7, 9, 10, 11, 12, 13, 18, 21, 22, 26, 27, and 28 improved their turnout time

performance from 1990 to 1992 while Fire Stations 1, 4, 5, 6, 16, 19, 20, 23, 24, and 25 did not perform as well in 1992 as they did in 1990. Further, Fire Stations 1, 3, 5, 6, 7, 8, 11, 13, 15, 17, 19, 21, 23, 24, and 26 improved their travel time performance from 1990 to 1992 while travel times increased for Fire Stations 2, 4, 9, 10, 12, 14, 16, 18, 22, 25, 27, and 28 from 1990 to 1992.

GRAPH 9

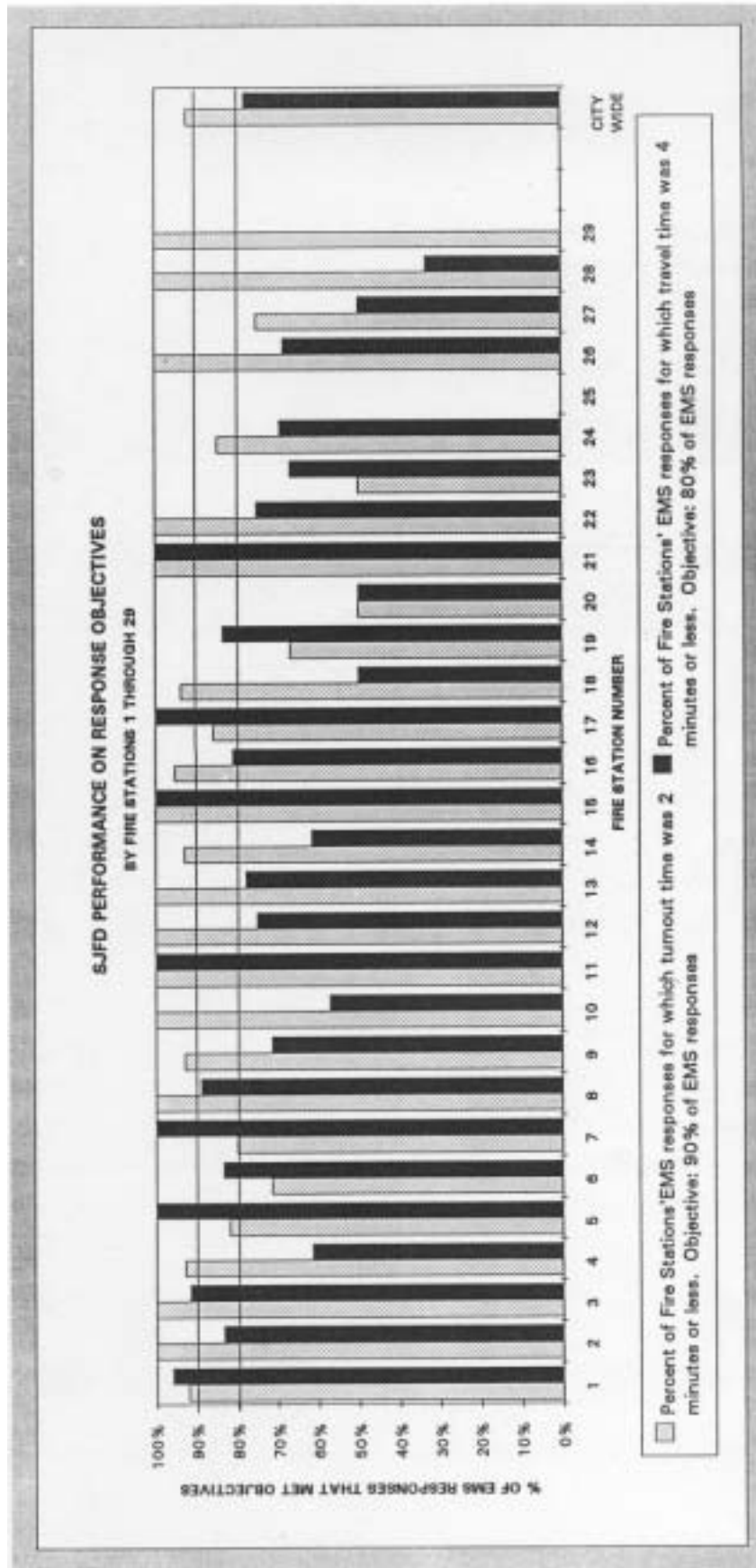


TABLE IX

**SUMMARY OF SAMPLE RESULTS FOR TURNOUT AND
TRAVEL TIME OBJECTIVES BY FIRE STATION**

PERFORMANCE OBJECTIVES	TURNOUT TIME		TRAVEL TIME	
	NOT TO EXCEED 2 MINUTES	NOT TO EXCEED 4 MINUTES	NOT TO EXCEED 2 MINUTES	NOT TO EXCEED 4 MINUTES

FIRE STATION	1990 TURNOUT TIME PERFORMANCE				1992 TURNOUT TIME PERFORMANCE				1990 TRAVEL TIME PERFORMANCE				1992 TRAVEL TIME PERFORMANCE				PERCENTAGE OF IMPROVEMENT (DECLINE)
	TOTAL		WITHIN 2 MINUTES		TOTAL		WITHIN 2 MINUTES		TOTAL		WITHIN 4 MINUTES		TOTAL		WITHIN 4 MINUTES		
	EN ROUTE	2 MINUTES	2 MINUTES	2 MINUTES	EN ROUTE	2 MINUTES	2 MINUTES	2 MINUTES	ARRIVALS	4 MINUTES	4 MINUTES	4 MINUTES	ARRIVALS	4 MINUTES	4 MINUTES	4 MINUTES	
1	41	38	93%	93%	25	23	92%	92%	30	30	100%	100%	25	24	96%	96%	4%
2	46	40	87%	87%	24	24	100%	100%	40	34	85%	85%	24	20	83%	83%	(24%)
3	31	29	94%	94%	24	24	100%	100%	29	26	89%	89%	24	24	100%	100%	0%
4	24	23	96%	96%	14	13	93%	93%	24	22	92%	92%	13	8	62%	62%	(30%)
5	15	14	93%	93%	11	9	82%	82%	15	11	73%	73%	11	11	100%	100%	27%
6	16	14	88%	88%	7	5	71%	71%	16	13	81%	81%	8	5	63%	63%	2%
7	9	7	78%	78%	5	4	80%	80%	9	8	89%	89%	5	5	100%	100%	22%
8	46	46	100%	100%	20	20	100%	100%	45	39	87%	87%	13	16	85%	85%	24%
9	26	23	89%	89%	14	13	93%	93%	26	21	81%	81%	14	10	71%	71%	(6%)
10	13	10	77%	77%	9	9	100%	100%	12	10	83%	83%	7	4	57%	57%	(26%)
11	4	3	75%	75%	3	3	100%	100%	4	4	100%	100%	3	3	100%	100%	25%
12	19	14	74%	74%	4	4	100%	100%	17	13	76%	76%	4	3	75%	75%	(11%)
13	15	10	67%	67%	9	8	89%	89%	14	8	57%	57%	8	7	88%	88%	21%
14	29	27	93%	93%	14	13	93%	93%	26	18	69%	69%	13	8	62%	62%	(18%)
15	4	4	100%	100%	2	2	100%	100%	4	4	100%	100%	2	2	100%	100%	25%
16	25	24	96%	96%	21	20	95%	95%	22	18	82%	82%	21	17	81%	81%	(11%)
17	7	6	86%	86%	7	6	86%	86%	7	6	86%	86%	7	7	100%	100%	14%
18	25	23	88%	88%	16	15	94%	94%	25	15	60%	60%	16	8	50%	50%	(10%)
19	14	13	93%	93%	6	4	67%	67%	14	9	64%	64%	8	5	63%	63%	10%
20	8	6	75%	75%	2	1	50%	50%	6	3	50%	50%	2	1	50%	50%	0%
21	13	10	77%	77%	4	4	100%	100%	13	10	77%	77%	4	4	100%	100%	23%
22	14	11	79%	79%	4	4	100%	100%	14	11	79%	79%	4	3	75%	75%	(41%)
23	20	17	85%	85%	6	3	50%	50%	18	11	61%	61%	6	4	67%	67%	6%
24	23	21	91%	91%	13	11	85%	85%	22	14	64%	64%	13	8	62%	62%	6%
25	5	2	40%	40%	1	0	0%	0%	4	2	50%	50%	1	0	0%	0%	(50%)
26	27	26	96%	96%	19	19	100%	100%	26	13	50%	50%	19	13	68%	68%	18%
27	9	6	67%	67%	4	3	75%	75%	9	7	78%	78%	4	2	50%	50%	(28%)
28	1	0	0%	0%	3	3	100%	100%	1	1	100%	100%	3	1	33%	33%	(67%)
29					1	1	100%	100%					1	0	0%	0%	N/A
COMBINED	528	468	88%	88%	292	268	92%	92%	501	383	77%	77%	295	222	75%	75%	

CONCLUSION

Our sample of EMS events in 1992 revealed that the San Jose Fire Department's (SJFD) Bureau of Support Services and Bureau of Field Operations met one of their three call-handling and response time objectives measured. However, we were unable to determine actual performance for the call-handling objective to dispatch the first due fire unit within 2 minutes after receiving the call transfer from San Jose Police Department (SJPd) for 90 percent of EMS events. The SJFD can improve its management reporting by segregating on its reports SJPd's call-handling activities from SJFD's call-handling. In addition, the SJFD was the first responder to 92 percent of the EMS events in our sample. Finally, the percentage of "dry runs" in our 1992 sample was significantly down from our sample results in 1990.

RECOMMENDATIONS

We recommend that the San Jose Fire Department:

Recommendation #3:

Change its computer programming to produce accurate management reports that segregate the San Jose Fire Department dispatcher call-handling times from those of San Jose Police Department dispatchers. (Priority 3)

Recommendation #4:

Set a target date for completing the design of usable management reports of Fire Communications' activities that satisfy department requirements. (Priority 3)

FINDING V

CITY COUNCIL DISTRICT 3 HAD THE HIGHEST VOLUME OF EMS EVENTS WHILE CITY COUNCIL DISTRICT 2 HAD THE LOWEST VOLUME

Part of our review was to determine where Emergency Medical Services (EMS) events were occurring within the city of San Jose (City). In addition, we analyzed how the San Jose Fire Department (SJFD) met its turnout and travel time response objectives by City Council district. The results of our sample of 297 EMS events indicate that:

- Downtown fire stations accounted for 24 percent of EMS call volume, while 8 of 29 stations accounted for 56 percent of the total;
- City Council Districts 3, 5, 6, and 7 were the districts with the highest EMS volume with each having more than 10 percent of total volume;
- The SJFD did not meet its turnout time objective of 2 minutes or less for 90 percent of EMS events in City Council District 4; and
- The SJFD did not meet its travel time objective of 4 minutes or less for 80 percent of EMS events in City Council Districts 1, 2, 4, 6, 7, 8, and 10.

The City's 1992 EMS Event Volume By Fire Station And City Council District

As shown in Graph 10, eight fire stations (Fire Stations 1, 2, 3, 8, 14, 16, 24, and 26) were the first due stations for more than half of our sampled EMS events.

GRAPH 10

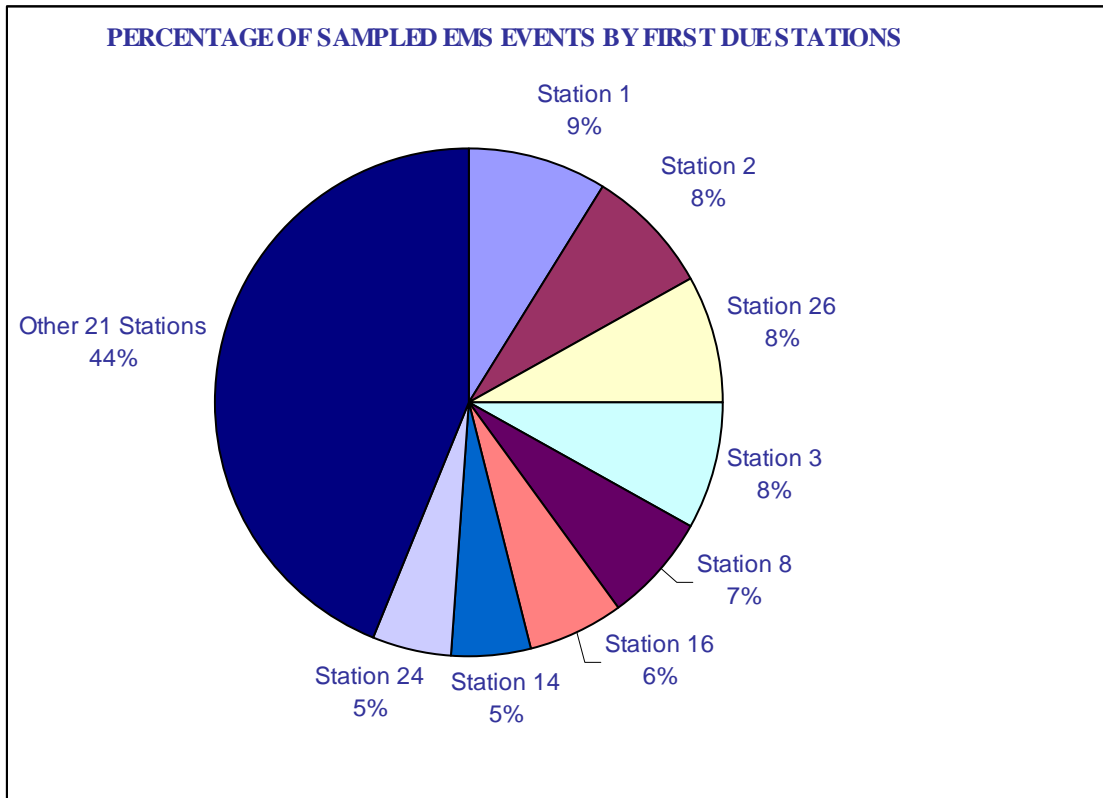


Table X on the next page lists the address and City Council district number for each of the City's 29 fire stations. Graph 11 on page 79 shows, in descending order, the frequency which each fire station was the first due station for our sampled EMS events.

TABLE X

ADDRESSES AND CITY COUNCIL DISTRICTS
FOR SJFD FIRE STATIONS

Fire Station #	Address	City Council District
1	201 N. Market Street	3
2	2933 Alum Rock Avenue	5
3	98 Martha Street	3
4	710 Leigh Avenue	6
5	1380 N. Tenth Street	4
6	1386 Cherry Avenue	6
7	800 Emory Street	6
8	802 E. Santa Clara Street	3
9	3410 Ross Avenue	9
10	511 S. Monroe Street	6
11	2840 The Villages Parkway	8
12	502 Calero Avenue	2
13	4380 Pearl Avenue	10
14	1201 San Tomas Aquino	1
15	1248 Blaney Avenue	1
16	2001 S. King Road	7
17	1494 Ridgewood Drive	9
18	4430 S. Monterey Road	2
19	1025 Piedmont Road	4
20	1433 Airport Boulevard	3
21	1749 Mt. Pleasant Road	8
22	6461 Bose Lane	10
23	1771 Via Cinco de Mayo	4
24	2525 Aborn Road	8
25	4758 Gold Street	4
26	528 Tully Road	7
27	239 Bernal Road	2
28	20399 Almaden Road	10
29	199 Caviglia Drive	4

GRAPH II

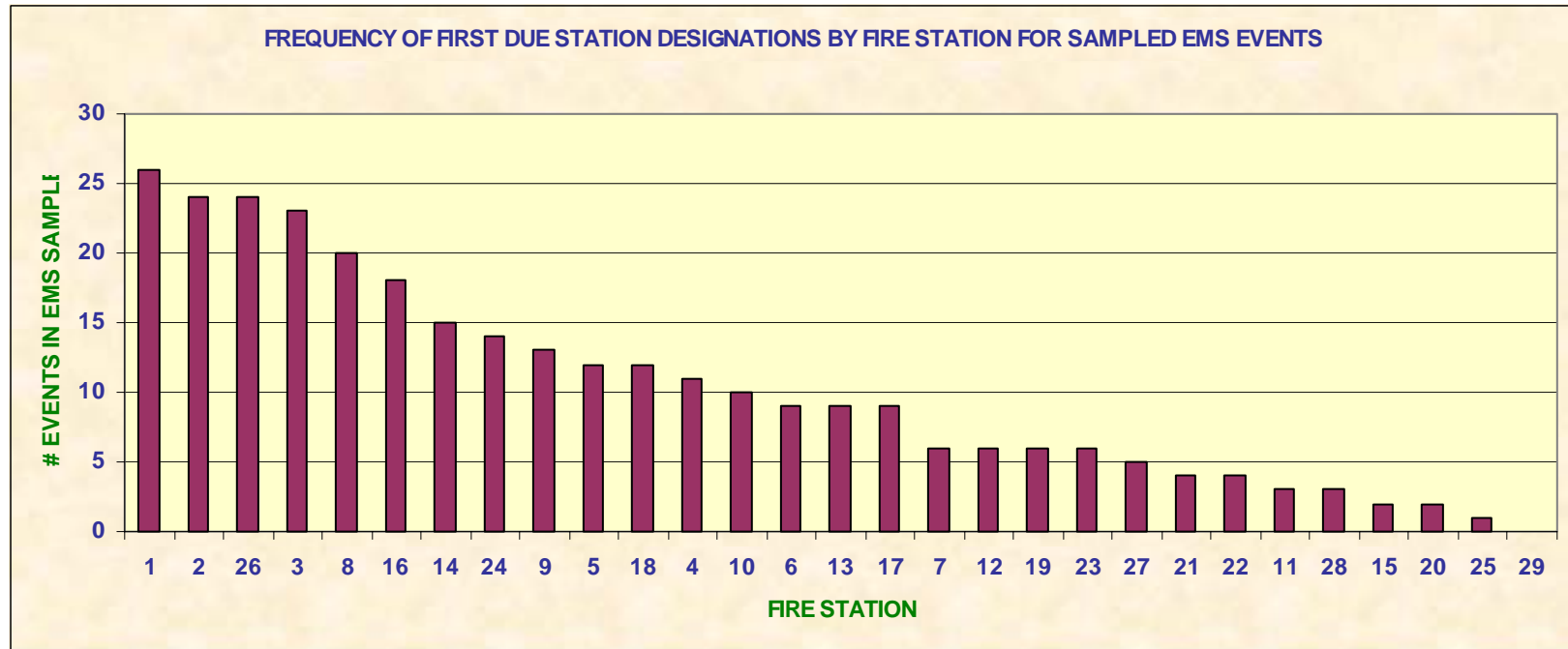


Table XI shows the first due station frequency for the 297 EMS events in our sample by fire station.

TABLE XI

SUMMARY OF EVENTS BY FIRST DUE STATION

<u>SJFD First Due Station Number</u>	<u>Number Of Events In Sample</u>	<u>Percentage Of Total Events In Sample</u>
1	26	8.75%
2	24	8.08%
3	23	7.74%
4	11	3.70%
5	12	4.04%
6	9	3.03%
7	6	2.02%
8	20	6.73%
9	13	4.38%
10	10	3.37%
11	3	1.01%
12	6	2.02%
13	9	3.03%
14	15	5.05%
15	2	.68%
16	18	6.06%
17	9	3.03%
18	12	4.04%
19	6	2.02%
20	2	.68%
21	4	1.35%
22	4	1.35%
23	6	2.02%
24	14	4.71%
25	1	.34%
26	24	8.08%
27	5	1.68%
28	3	1.01%
29	<u>0</u>	<u>.00%</u>
TOTAL EVENTS IN SAMPLE	<u>297</u>	<u>100.00%</u>

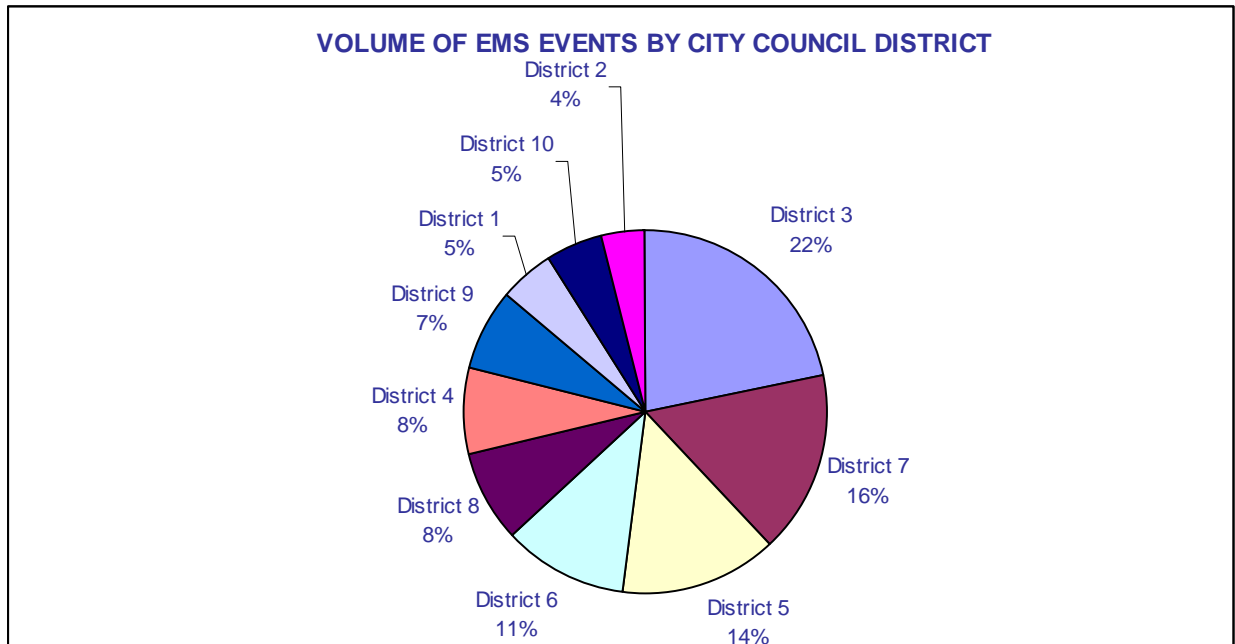
Fire Station 1 was the first due station for the highest volume of EMS events in our sample (8.75 percent) followed closely by Fire Stations 2 and 26. Downtown Fire Stations 1, 3, and 8 together accounted for approximately 24 percent of total EMS event volume. Fire Stations 15, 20, 25, and 29 had the lowest volume with less than 1 percent each.

Table XII summarizes, by City Council district, the number and percentage of EMS events in our sample. Graph 12 illustrates the volume of EMS events by City Council district from the most to the least volume.

TABLE XII
SUMMARY OF SAMPLED EMS EVENTS
BY CITY COUNCIL DISTRICT

<u>City Council District</u>	<u>Number Of Calls In Sample</u>	<u>Percentage Of Sampled EMS Calls</u>
1	16	5%
2	11	4%
3	66	22%
4	23	8%
5	41	14%
6	32	11%
7	48	16%
8	25	8%
9	21	7%
10	<u>14</u>	<u>5%</u>
TOTAL	<u>297</u>	<u>100%</u>

GRAPH 12

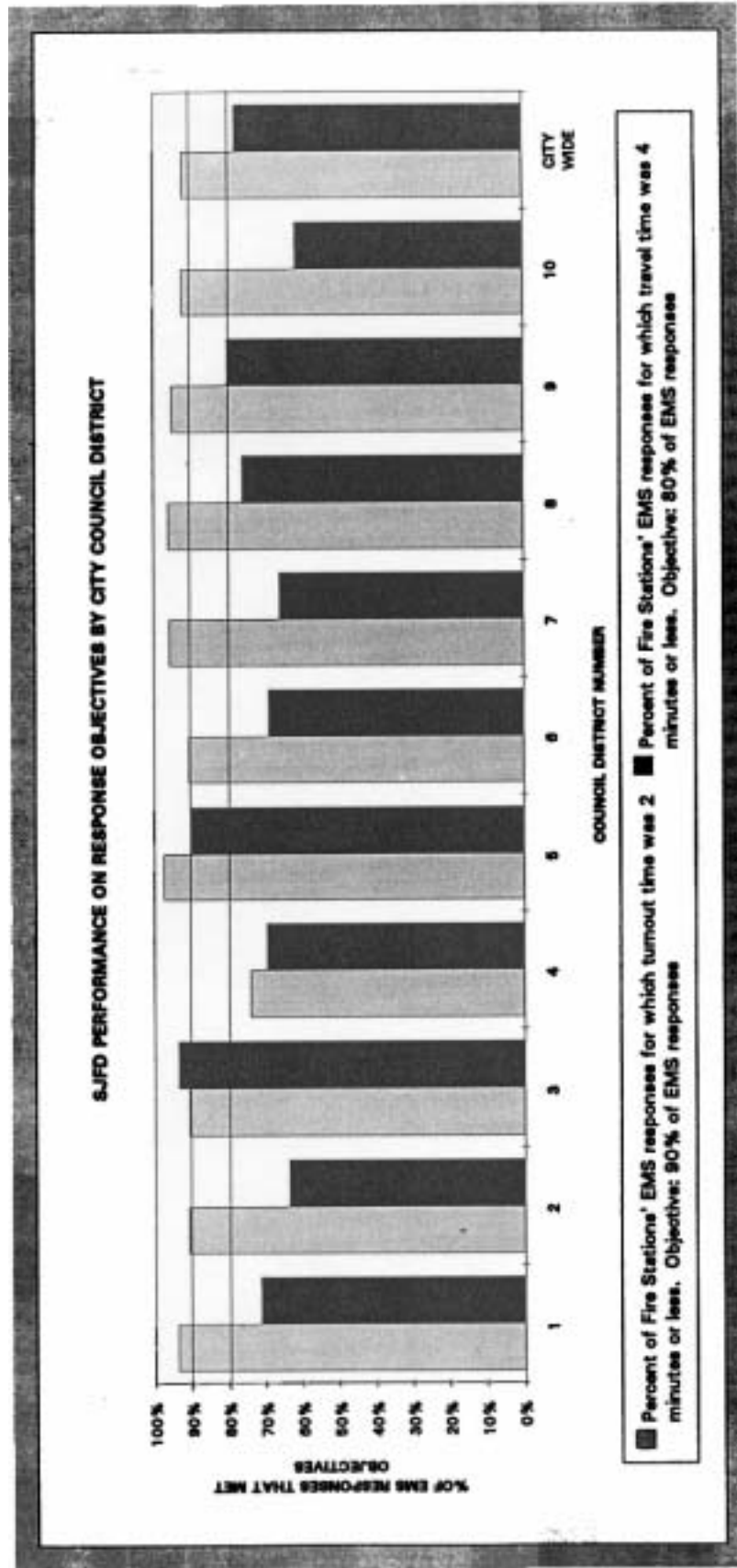


As shown in Graph 12, City Council District 3 had the highest volume of sampled EMS events while City Council District 2 had the lowest volume.

**SJFD EMS Turnout And Travel Time
Performance On A City Council District Basis**

The results of our sample regarding SJFD's EMS turnout and travel times are displayed on a City Council district basis in Graph 13.

GRAPH 13



City Council District 4 was the only district in which the SJFD did not meet its objective of a 2-minute turnout time for 90 percent of EMS events dispatched. Specifically, Fire Stations 5, 19, 23, and 25 within City Council District 4 all failed to meet the 90 percent objective. Further, the SJFD did not meet its 4-minute travel time objective for 80 percent of EMS events dispatched in 7 of 10 City Council districts. Specifically, the travel time objective was not met in Districts 1, 2, 4, 6, 7, 8, and 10.

A summary of EMS response time performance by fire station and City Council districts is at Appendix F.

CONCLUSION

Fire stations in downtown San Jose and on the east side of the City continue to have the highest volume of EMS calls in their station response areas. San Jose Fire Department (SJFD) is meeting its turnout time objective City-wide, but needs to improve turnout time in City Council District 4's fire stations. In addition, the SJFD could improve its overall travel time in a majority of the City Council districts.

OTHER PERTINENT INFORMATION

Capturing 9-1-1 Call And EMS Event Electronic Time Stamps

Diagram 2 illustrates the various computer systems the San Jose Communications Center (SJCC) and the Santa Clara County Communications Center (County Center) use for capturing 9-1-1 call and EMS event electronic time stamps. For example, Diagram 2 includes the EMS dispatch process from "first ring" at the SJCC when the event information is routed to the County Center.³⁶ Diagram 2 also shows how the process differs for 9-1-1 and 7-digit number emergency calls. An incoming 7-digit number call will not use the Positron system for automatic address location and will have fewer electronic time stamps since it does not get handled by the Positron.

At the SJCC, electronic time stamps are recorded by:

- 9-1-1 Positron System (supplied by Pacific Bell)
- ACD (Automatic Call Distributor) System
- CAD (Computer-Aided Dispatch) System
- Voice Recording System

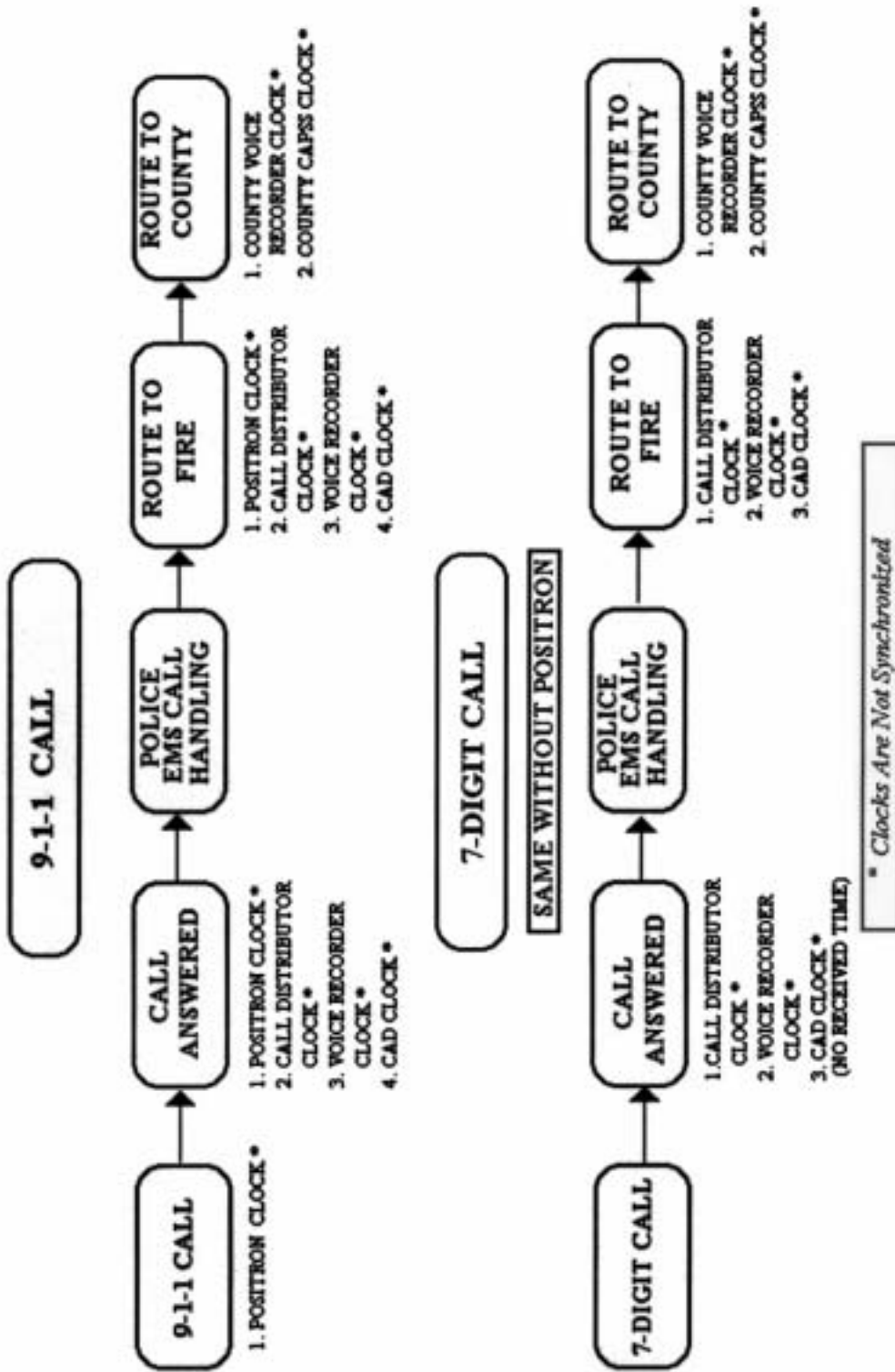
At the County Center, electronic time stamps are recorded by:

- ACD (Automatic Call Distributor) System
- Voice Recording System
- CAPS (Computer-Aided Public Safety) System

³⁶ When the County Center is the PSAP for answering the 9-1-1 call instead of the SJCC, the County Center's call distributor system clock records an electronic time stamp in the same way as does the call distributor system at SJCC.

DIAGRAM 2

SUMMARY OF SYSTEMS TO RECORD TIME DURING THE EMERGENCY CALL PROCESS



None of the clocks for the systems within each respective communications center are routinely or systematically synchronized; nor are the centers' clocks intentionally synchronized to each other. For example, during our review we found the CAD system clock to be consistently "faster" than the Positron system clock, the difference being as little as 20 seconds and as much as 1 minute 8 seconds.

Both San Jose Police Department and San Jose Fire Department officials are aware of the clock synchronization problem. A joint task force has examined several potential solutions in the past year, but to date they have not found a workable solution. SJCC operating management should continue to pursue a way to keep its various system clocks in synch with each other. Synchronized clocks will make management reports more meaningful and will greatly facilitate research of individual event records.